The Chemical Age

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Notes and Comments

The British Celanese Inquest

THE dangers of development work in chemical industries were graphically brought home to the general public by the inquest upon the three men who died as the result of inhaling chemical fumes at the British Celanese works. There seems to be more than a suspicion that two earlier deaths were due to the same cause. Those engaged in the industry know full well what perils—unsuspected as well as fully known—lurk in chemical process work. Chemicals that cause immediate death or illness are well enough understood and with them few accidents are likely to arise from causes beyond the knowledge of man to foresee and prevent. It is different with the insidious substances that, when inhaled, have a cumulative effect. Certain people are susceptible to attack whilst others seem to be immune. It may be that in a gang of men only one or two are susceptible; the process may work for a year before a death occurs. The fellow workmen report that the victim had been ailing for some time, so death is ascribed to natural causes. It is not until a series of deaths occur, perhaps extending over many years, that suspicion is aroused. Even then there may be some local difference in practice which prevents the fatalities in some works, so that the chemical in question is not suspected.

The only safeguard is the pooling of knowledge and experience so that dangers can be earlier recognised and the best precautions can be adopted by all. We had occasion to remark in our issue of January 13 that the chemical industry has a remarkable record of safety; in spite of the unusual dangers from the materials used, our industry is " as safe as any in the country." We may ascribe that immunity to the high technical standard of those directing the works from staff positions, but even their efforts would be far less effective were it not that the Home Office Inspectors act as a clearing house for information and are always ready to advise in regard to safety measures.

A Potential Danger

THE deaths at the British Celanese works must be regarded as coming under the category of insidious poisoning that had been absorbed by the victims for long before anyone realised what was happening. It would appear from the account of the inquest that it is still uncertain which of the particular chemicals used was responsible. A derivative of ethylene glycol or ethylene glycol itself is under suspicion, but neither of these substances appears to have been previously noted as being dangerous, or even suspicious. The evidence showed that " chemicals in many varieties were used "; the Home Office had had experiments made by chemists to ascertain which of these chemicals was likely to have been the cause of the deaths; but there does not appear to have been a final answer found to the problem. The only definite statement appears to have been that " whether ethylene glycol could be used with safety depended on circumstances." There is here a potential danger, and that danger remains unknown and may, under quite other circumstances, be the cause of further deaths in other works.

We recognise, of course, that experiments conducted in secrecy with a view to the discovery of a new process cannot be made public without nullifying the work that has been done. Nevertheless the safety of the worker must be the prime factor in the case. It is manifestly impossible to work a process that is accompanied by an unavoidable toll of human lives, and we deprecate the holding of such inquiries in secret. We feel that at least it should be possible to issue a report which should give all the essential details without disclosing the exact nature of the process. The only protective influence is frequently the Home Office Inspector; we anticipate that the matter can hardly be left in the present stage of uncertainty. If the process is abandoned there is no need of secrecy. Whether it be abandoned or not safety precautions to be adopted with the particular chemical found to be responsible could be issued without detriment to the development of the new process.

Scientific and Industrial Research

ELSEWHERE in this issue we publish extracts from the annual report of the Department of Scientific and Industrial Research, so far as they are of interest to the chemical industry. That many of the investigations carried out during the year under review are of great value to the industries concerned there can be no doubt, but there are two ways of looking at the report, which the " Sunday Times " describes as the New Parable of the Talents.

Here is the point of view of " The Independent " as expressed in its editorial notes last week: " The State has spent a million pounds, and in the result we are informed that improvements have been discovered in a number of matters such as frozen water-pipes, house-warming, storage of bacon, the purity of cocoa, the shrinkage of woollen garments, the wear and tear of laundries, the making of boots and shoes,

and the replacement of fireclay boxes. A perusal of the report leads us to suppose that nothing would have been done in all these matters but for the existence of this official department and for the expenditure of this vast sum of money. Indeed we are informed of many other researches waiting for similar treatment."

It is suggested that, in official eyes, "the manufacturers and traders in all these things are presumably an ignorant, indolent, inefficient class who would continue in their primitive ways without regard to science unless these bureaucrats taught them better. Remembering, however, that necessity was, and still is, the mother of invention, and that competition still has a bearing upon competence, we are not inclined to take this official catalogue of self-congratulation at its full face value. We wonder rather how many improvements have been warned off the market by the existence of this leisurely and expensive office. The time has not yet arrived when we can be sure that invention and genius will always appear to the order of a committee."

Pure and Applied Chemistry

OUR correspondent "Ignoramus"—surely one of the least appropriate of pseudonyms!—gave us a timely reminder in THE CHEMICAL AGE last week concerning the value of pure research to the applied chemist. We particularly like the remark regarding Faraday's electrical experiments that "Perhaps one day something will come from them which statesmen can tax."

We hardly agree with "Ignoramus" that we should be thankful that there are men willing to spend their lives in the thankless task of patiently unravelling the secrets of Nature. For ourselves we can conceive no greater pleasure, no more perfect life, than one spent in research. There is another angle, however, to the views put forward by our correspondent. The volume of published work in all parts of the world is truly enormous. One of the minor tragedies is the time and labour expended by men in discovering facts already discovered by someone else, but published in an obscure journal and therefore forgotten. It is just as important to keep a record of facts published throughout the world as to conduct new researches. To preserve libraries in which the scientific literature of all nations is preserved is no doubt valuable, but it is not enough. There is the language difficulty; there is the further difficulty that many facts are published in papers of which the title gives no indication that they contain such facts.

The labour of making a properly compiled index of discovered facts would be great and the cost would be high, but we wonder whether such a work conducted partly by subscription and partly by Government aid would not prove to be a valuable investment, particularly if the effort could be made internationally. It is true that several societies publish "abstracts" but all who have had experience of consulting the originals know how much is left out; the abstractors themselves are pained to find how little they can compress into the space at their disposal. Abstracts, moreover, have another defect, namely that they take no account whether the work has been published before. What is required is a body of men, somewhat equivalent to the staff of the patent office, who would sift every paper for new facts and ideas. These men would be experts in their particular subjects and might even submit their findings to yet greater outside experts. Publication in the international register of new facts would be considered as the hall-mark of a research. Having selected the facts they would (*a*) publish them in an annual register and (*b*) prepare a careful index under as many cross-references as possible.

Heat Insulation

UNDER average industrial conditions a bare 8 in. flange connection on a steam pipe can waste one ton of coal each year; one foot-length of 3 in. steam pipe will waste 7 cwt. of coal. Have you ever measured the amount of uninsulated steam pipe which is to be found in your works? As a manufacturer of chemicals, steam is indispensable to you—it is "heat on tap," always ready to serve at those particular points in your works where heat is wanted. Steam, too, costs no negligible sum of money to produce, and the higher its temperature in transit by pipe, the easier it is to lose money by lacking of insulation. When equipment needs insulation and you do not buy it and use it, you spend part of your would-be profit in warming the surrounding air. "Insulation costs nothing to use, but it is expensive when you do not use it," is the slogan adopted by one manufacturer of such materials. An efficient heat insulator should be non-corrosive at all temperatures on the surface to which it is applied, whether wet or dry. It must also have ability to resist damage by moisture, and even if it becomes saturated with moisture it should be capable of being dried out by the internal heat of the apparatus without adverse effects. In addition it should have a permanent structure with no liability to "settle down" in service and consequent loss of efficiency. Reasonably good mechanical strength is also necessary to withstand the wear and tear of service conditions, to which, of course, must be added, very low heat-conducting properties, low heat capacity and a low surface temperature to minimise loss of heat by radiation. A wide range of insulating materials is now available. Magnesium carbonate, one of the most effective and most generally applicable, was referred to in THE CHEMICAL AGE last week.

Calorific Value Definitions

ARISING out of a resolution made at the London Fuel Conference in 1928, the International Standards Association is now giving consideration to the setting up of standards dealing with the definition of gross and net calorific value in respect of solid, liquid and gaseous fuels. It was the British Standards Institution that accepted the invitation of the World Power Conference to undertake to present the viewpoint as to what was the practice in Great Britain in regard to these definitions and the way in which they were used. Following upon this the British Standards Institution have decided that its recommendations as forwarded to the International Standards Association should be published in order that they might be given full weight in any international consideration which might take place. Copies of this new British Standard Specification (No. 526-1933) may be obtained from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1.

State-Aided Research

Views of the Advisory Council of the D.S.I.R.

THE Annual Report of the Department of Scientific and Industrial Research for 1932-33 (H.M. Stationery Office, price 3s.) points out that the grant of £1,000,000 made by the Government in 1917 for the encouragement of industrial research has become exhausted, and that the Department's grants are now being made from its Parliamentary vote. It is stated that the expending of the Million Fund has attracted a total industrial contribution of £1,750,000 and at the moment the State is contributing £65,000 a year and industry £170,000 a year towards the support of a group of 19 research associations.

The institution of the million fund was announced by Lord Crewe in December, 1916, roughly two years before the conclusion of the war. The money was voted by Parliament and became available in July, 1917. The scheme was announced in the summer of the same year. During 1918 four associations were licensed by the Board of Trade under the scheme: ten in 1919; nine in 1920; and one each in 1921 and 1923; while two more were formed in 1926.

A Wide Field of Operation

These associations covered a very wide field of industrial operations. They included organisations for the textile industries, the metallurgical industries, scientific instruments, the electrical and photographic industries, and such widely diverse manufactures as leather, boots and shoes, cocoa, chocolate, jam and confectionery, preserved foods, rubber, glass, refractory materials, shale oil, flour milling, paint, motor-cars and motor cycles, portland cement and laundering. Some of them never became effective entities, *e.g.*, the Music Industries Research Association; others, after same years' active work, ceased to operate or became merged in other bodies which are carrying on, in a somewhat different fashion, the underlying intention for which the co-operative associations were formed. For example, the Photographic Research Association has ceased to function; but in that industry there now exists a powerful combination representing an overwhelming proportion of the entire British industry in that field which has been able to consolidate and develop its own research organisation and to carry on the investigations which previously occupied the attention of the research association. At the moment the scheme comprises 19 associations in active existence, 17 of which are in receipt of grant aid. They include in their membership some 5,000 firms and collectively represent co-operative research activity on the part of manufacturing industries responsible for one-half of the total exports of this country.

Concurrently with the development of research associations, there has been considerable advance in the organisation by industrial firms of research departments of their own. The powerful resources for research possessed by firms in the chemical, electrical and certain other industries are notable examples. Developments of this character and magnitude are of national importance, and from the point of view of the research association movement, are to be welcomed. There is no question that the greater employment by member firms of skilled scientific staff helps materially to make the associations more effective. One of the principal difficulties has been in the transition from the laboratory experiment to application on a large scale, due too often to inadequate appreciation of the significance of the laboratory results and insufficient ability to make the best use of them.

Typical Achievements

The Cast Iron Research Association has conducted investigations which, if fully adopted would result in a saving of fuel and other economies amounting to £200,000 per annum, besides producing a range of heat-resisting iron alloys of great importance. The Iron and Steel Industrial Research Council, one of the more recently established co-operative organisations, has completed research work, the full appreciation of which it has been calculated on a basis of production in 1930, would result in a saving of about £392,000 worth of coke used in the production of pig-iron and in the production of finished steel, a saving in coal of no less than £1,341,000. The Non-Ferrous Metals Research Association has also made outstanding advances; it will suffice to mention two—the work on new ternary lead alloys used in the sheathing of cables and for water-pipe service; and that on aluminium-brass for condenser tubes with corrosion resistant properties. The Refractories Research Association has been able to make suggestions which have had the effect of prolonging the life of some types of saggars (the fire-clay boxes in which pottery is fired) from seven firings to 200 firings. The estimated annual expenditure on the replacement of saggars is £200,000.

The textile research associations have greatly benefited their industries by devising and introducing methods of scientific control, in the process subsequent to weaving, which have served greatly to enhance the appearance of textile fabrics. This is particularly characterised in the case of the Cotton Industry Research Association, whose operations have greatly assisted this end of the trade, as well as providing material help to the spinners and weavers. The Wool Industries Research Association, to take some of its more concrete achievements, has achieved notable results in devising improved forms of both woollen and worsted machinery for carding and spinning, in producing a permanent and non-yellowing bleach upon wool and finished fabrics, and in providing, as a substitute for tar, a sheep marking fluid which is impervious to weather conditions but completely removable on scouring. The section of the work of the Linen Industry Research Association which has attracted most public attention is that on pedigree flax seeds and fibre production.

A Wise Expenditure of Money

The present Advisory Council state in their report that they have no hesitation in saying that the scheme inaugurated sixteen years ago by their predecessors has amply justified the faith then displayed and has more than justified the money expended upon it both by the State and by the industries themselves. The financial aspect of the movement, however, calls for examinations with care. At the outset grant aid was offered on the basis of the State providing a pound of income for every pound subscribed by industrial firms for the general purposes of the organisations. In these circumstances it was hoped that at the end of five years, the scheme would be sufficiently established in the eyes of industry for its finance to be derived solely from industrial sources. Unfortunately, the early years of the scheme, after the first evanescent prosperity arising from the war had disappeared, coincided with industrial depression in varying but increasing intensity; until at length a degree of depression was reached that has had no counterpart in the memory of manufacturers.

The " Datum Line " Principle

At a time when industrialists were already feeling the strain, the initial quinquennial period came to an end, and the Department, in fulfilment of the original intention to make the associations self-supporting at the earliest possible date, instituted a scheme of diminishing grants in the hope that industry would increase its support in inverse ratio. The times were not propitious and the movement was of too slender a growth to flourish under such a drastic curtailment of State support. Accordingly, before the second five-year period had elapsed, a different system was devised on a temporary basis. It is known as the " datum line " principle. Each association was examined to see what scale of expenditure might in all the circumstances be regarded as a more or less satisfactory nucleus for a co-operative research organisation of the kind. That figure was termed the datum-line figure, and up to its amount no grant was paid in respect of the trade income represented by it. But above that figure and up to a maximum represented by the datum figure itself, the Department agreed for the time being to contribute £ for £. If, therefore, the fullest advantage of the offer were taken, the State

would temporarily contribute one-third of the total income, or 10s. against £1 of income from industrial sources.

Thus at the end of sixteen years the Government is still contributing to the support of the associations and has improved upon its original promise of the sum of one million pounds by making provision, on the exhaustion of that fund, in the annual votes of the Department. While from one point of view the Advisory Council do not grudge the annual payments thus made, for it is being recovered in full measure as value received, yet they cannot mention these facts without some sense of disappointment that the goal of creating a number of strong self-supporting associations has not yet been reached. Considerable allowance has, however, to be made for the fact that, save at the outset, the movement has coincided with a period of unexampled economic and industrial depression, accompanied by high taxation.

The Economics of the Case

The average expenditure of the nineteen associations is £14,500 per annum, but if six associations spending £14,000 or more be omitted, the remaining thirteen have an average annual expenditure of £6,765. These nineteen associations represent industries having an aggregate net output of £440,000,000 or so annually (Board of Trade 1930 Census of Production), out of a total for the factory and non-factory trades of the United Kingdom of £1,450,000,000 annually, and which are responsible for exports amounting to £176,000,000 out of a total for the United Kingdom of £365,000,000 (1932 figures). It is clear that organisations working on the slender basis that has been indicated are hardly commensurate with the industries they serve, nor can they hope to be the fully effective weapons for dealing with the wide range of problems presented by major industries that they would wish to be. It is found, in fact, that the average contribution to the research associations amounts to no more than about 7s. 6d. per £1,000 of net output, which is a small sum when it is remembered that (on an average) a £35 subscription entitles the donor to the benefits of an organisation costing £14,000 odd a year.

The Advisory Council's criticism of the movement is therefore that it is financed on a totally inadequate scale to realise the full measure of its possibilities. In their report for 1931-1932 they referred to discussions that had taken place as to the feasibility of a General Enabling Bill under which Orders in Council could be made, requiring firms to contribute to the support of a co-operative research organisation where the bulk of the industry concerned desired such a step. Such a proposal, if adopted, would have greatly increased the possibility of placing the finances of research associations on a stable footing. It was stated, however, that the general consensus of opinion among the governing bodies of research associations was, for reasons indicated, unfavourable to the proposal. The objections cited against any such step was nevertheless appreciated but at the same time felt that if, in any particular industry, suitable proposals were evolved with the support of the necessary majority of the industry, a measure to give effect to them deserved the sympathetic backing of the Government.

The Outlook for the Future

In these circumstances the general system of support by the voluntary subscriptions of member firms must for the present remain the basis on which the associations are to rest, and it is to be hoped that industry will be increasingly responsive to their claims. The Advisory Council point out that it has to be remembered that if the world objective of a steady reduction in tariffs was carried out our industries would still have stiff, and perhaps stiffer, competition to face, and must be prepared for it by using every method, including research, to promote their efficiency. Support of the research association movement is therefore one means by which investigations of a fundamental character can be put on foot in a relatively inexpensive fashion.

Packing and Storage of Chemical Products in Ships

Modifications to the Board of Trade Memorandum

IMPORTANT modifications to regulations governing the carriage of chemicals are contained in the Report of the Departmental Committee appointed by the Board of Trade to consider the existing Board of Trade "Memorandum on the Carriage of Dangerous Goods and Explosives in Ships" (H.M. Stationery Office, price 2s.). This committee was appointed in February, 1930, and comprised Major Thomas H. Crozier, chairman, Mr. C. H. Boyd, Mr. H. H. Brashier, Mr. A. G. Francis, B.Sc., F.I.C., Mr. J. R. Hobhouse, Captain S. McC. Hopkins, Captain H. B. Pope, Mr. J. Davidson Pratt, B.Sc., F.I.C., and Mr. Leslie Roberts.

It appeared to the Committee that their task required consideration of the following three main questions:—(a) The form of rules suitable for international adoption; (b) the substances which, having regard to the conditions on board ship, ought to be regarded as dangerous, and the rules for their carriage on board ship; and (c) whether, in addition to rules for the packing and stowage of particular substances, any other general conditions should be imposed for the purpose of securing the safe carriage of dangerous goods by sea.

Foreign Regulations Considered

The Board of Trade Memorandum, which has been in existence for many years, was first adopted in its present form in 1924. Part I containing the various statutory provisions relating to explosives, petroleum, etc., and general rules as to cylinders for gases; Part II is a list of individual substances. The substances referred to in Part II are set out in alphabetical order and the rules for their carriage on board ship are in narrative form. Generally the nature and properties of the substances also are given. According to the present report, however, this arrangement has the defect that substances with similar characteristics for which similar precautions should be adopted are widely separated in the text of the Memorandum, with the result that the general principles governing the carriage of dangerous substances of a like nature tend to become obscured.

The foreign regulations which the Committee examined differ in form and also somewhat in scope from the Board of Trade Memorandum, but they were impressed by the fact that common to most of them is a system of classification based upon the grouping of substances similar in nature. Such a system has a number of very real advantages over that adopted in the Board of Trade Memorandum. It emphasises the dangerous qualities common to different substances falling within the same category and facilitates administration and the framing of the rules, both general and particular, which should be observed when these dangerous substances are carried on board ship. It also facilitates the inclusion within the scope of the rules of substances which may become articles of commerce in the future and which will fall naturally into one or other of the groups. It, further, would form a very useful basis for comparison of the conditions imposed by those responsible for the safey of life at sea and by other transport authorities, *e.g.*, railway companies, dock and harbour authorities, who in many cases have their own regulations.

The Committee have therefore come to the unanimous conclusion that the most suitable form of rules, and, having regard to the form of the foreign regulations we have examined, the form most likely to meet with general acceptance by foreign maritime power is one in which all substances with similar properties are brought together in one category or group, and in which the conditions which should be laid down for their packing, storage, etc., are, whether peculiar

to the substance or general to the category, set out in sufficient detail under the substance or the category.

They considered various possible methods of classifying dangerous substances and came to the conclusion that the most suitable classification would be one in which the substances were divided into the following main categories:—(1) Explosives, (2) compressed "permanent," liquefied and dissolved gases, (3) substances which become dangerous by interaction with water or air, (4) substances giving off inflammable vapours, (5) corrosive substances, (6) poisonous substances, and (7) miscellaneous.

Part II of the appendix to this report is therefore divided into seven sections corresponding to the seven categories in which the substances have been classified. Each section contains descriptions of the properties of the substances mentioned therein together with rules for carriage on board ship. Drafts of these sections were brought to the notice of various interests concerned, whose representations were fully considered and appropriate modifications were made in the drafts where thought consistent with safety. This method of procedure necessarily entailed the consequence that the progress of the work was somewhat slow, but it possessed the advantage of enabling the Committee to frame their proposals in their final form after due consideration of all the facts and arguments presented to them

Packing and Storage

Examination of foreign regulations showed that methods of packing and stowage varied in some cases from those approved by the Board of Trade for identical substances so that, having regard to the exigencies of international trade, the Committee considered it desirable to ascertain to what extent, consistent with safety, methods permitted in other countries could be approved here.

The existing rules restrict generally the weight of packages of dangerous substances which must be carried on deck to 2 cwt. This weight is as much as can be handled readily in an emergency on the deck of a ship at sea, and, as it may be necessary to jettison packages of specially dangerous character without delay, the Committee consider this limit is reasonable and should be retained generally for this class of cargo. They consider, however, that the restriction may be relaxed in suitable instances (*e.g.*, where the dangerous substance is packed with absorbent material) and that it need not apply to inflammable liquids miscible with water.

The rules contained in the existing Memorandum for packing and stowage were found to be reasonable, but in some cases new methods have been incorporated in the present report and certain inconsistencies in the treatment of substances having similar properties have been removed. It was regarded as essential to prescribe definitely in all cases that sufficient air space must be left in containers for liquids so as to eliminate risk of damage to the containers from internal pressure arising from thermal expansion. The minimum spaces which should be allowed have been ascertained and inserted accordingly as a separate requirement.

Modification of Present Rules

Some additional substances and groups of substances, which are not included in the Board of Trade Memorandum, have been incorporated in their appropriate places in the various sections, *e.g.* copper sulphate, sulphuryl and thionyl chlorides, bichromates, bromates and permanganates.

In several instances the maximum amounts allowed in packages have been slightly modified, being either rounded up so that the maximum benefit may be obtained from the development of modern containers, or adjusted so as to be equivalent to a round quantity in the measures of other countries. For sulphuric acid and phosphorus the increases are considerable. In the case of sulphuric acid there is a demand for an increase in the size of drums from 10 cwt. to 14 cwt. In the light of all facts it was considered that 14 cwt. might be allowed for stowage under deck where precautions to deal with leakage are adopted. Phosphorus has hitherto been allowed on deck in containers up to 55 lb. packed in cases, with not more than two containers in a case. A demonstration satisfied the Committee that larger quantities, up to 5 cwt., may safely be allowed on deck in suitable containers and they have ascertained that, in fact, these larger containers are widely used.

Hydrocyanic acid (prussic acid) at present may only be carried on board ship when contained in gas cylinders. We have considered proposals to pack it (a) when absorbed in a porous substance in suitable containers, and (b) in glass containers suitably packed in cases. The Committee are of opinion that, provided the gas is effectively stabilised, both these additional methods may be allowed.

Mixed Consignments of Chemicals

Films have either a nitro-cellulose base and are highly inflammable or have other bases which render them so much less inflammable that they are known as "slow burning films" and fall outside the classification of dangerous goods. The conditions contained in the Board of Trade Memorandum were undoubtedly intended to relate to the former only, but this was not so stated. They have accordingly distinguished between the two kinds of films and have indicated that restrictions apply only to films made from a nitro-cellulose base.

The conditions of carriage for mixed consignments of small quantities of chemical and medicinal preparations were the subject of special consideration and the rules drawn up are designed to limit as far as possible the consequences of any dangerous interaction or escape of the contents resulting from damage to, or leaking from, the containers in any individual package.

Gas Cylinders

The existing rules require gas cylinders to be stowed under deck (*i.e.*, in covered spaces), firstly, because it has been thought difficult to secure articles like cylinders on deck and there would be considerable risk of damage to the cylinders if they broke loose, and secondly, because, if stowed on deck, the cylinders would be subject to unduly high internal pressure from exposure to the direct rays of the sun. While stowage under deck undoubtedly affords better security by lessening the risk of damage in bad weather, as it is difficult to maintain the security of articles on deck, the Committee understand that considerable numbers of cylinders have been safely carried in certain ships of moderate size, the cylinders being lashed down and secured in suitable spaces (*e.g.*, the space between the after hatches), and protected from the sun by tarpaulins being stretched over them at a fair height. It has also to be borne in mind that if the cylinders are stowed on deck the danger of poisoning in the event of damage to or explosion from the cylinders would, of course, be lessened, as the occurrence would take place in the open air and the gas would be more readily dispersed. As to damage arising from internal pressure which might be caused by exposure of the cylinders to the direct rays of the sun if stowed on deck, it is suggested that with properly constructed and correctly filled cylinders, the risk of explosion from excessive pressure is small.

Having very carefully reviewed all these considerations, the Committee have come to the conclusion that stowage on deck may be allowed in ships which have spaces suitable for the purpose. They recommend that cylinders containing compressed "permanent," liquefied or dissolved gases should be stowed not let than eight feet from the ship's side, under cover, in cool well-ventilated spaces. They should not be stowed on deck unless they can be adequately protected from heavy weather and from the direct rays of the sun.

Marking of Packages

In regard to the marking of packages, the Committee recommend a scheme of labelling so devised that specifically coloured cards or adhesive labels can be used to denote both the contents of packages and the kind of risk involved in carriage. Stencilling or other lettering on the outside of packages should be in red except where the packages are coloured red all over when the stencilling may be of any suitable colour. This would not apply to any paint marks used by the shipping company to denote the destination of the package. Such a scheme has the merit that in a short space of time the nature of the contents of packages so marked should be easily recognisable in any part of the country in which the packages might have to be handled, and in any ship in which they might be carried, by the kind of label used. Full details of a suitable scheme which has been prepared will be found in Part I of the appendix to the present report.

The Future of the Chemist in Industry

By S. REGINALD PRICE

A VAST system of production is being evolved of all sorts and kinds of human requirements, from necessities to so-called luxuries, and we cannot set a limit to the possible production capacity of this system. This system with its processes, its machines, its workers, its potentialities may be referred to as the "production machine." What is to happen to this machine in the near future and the more distant future? The chemist with his fellow scientists is largely directly responsible for creating this machine, or at least for providing the material from which it has been created. The "production machine" is making a bid to dominate the social system. Whatever catalytic causes may have been at work, and in some ways the most powerful catalyst in speeding the reaction was the great war, the chemist cannot shirk responsibility for his part in the genesis of the "production machine." He is not alone—his burden must be shared, if burden it be, by the physicists, the biologists, the mathematicians, the engineers and in fact by all who have helped to work out the application of the principles and have tended and fed the machines with more and more chemistry, more and more physics, more and more research. The slow and measured processes of nature have often been replaced by synthetic or mechanical processes. The product which Nature takes a year to perfect is produced in a few hours—or a substitute of almost equal utility. Hence production costs have fallen, goods are cheaper in relation to the time and labour spent on them, the luxuries of yesterday have become the necessities of to-day and the range of requirements of the ordinary member of the community have increased out of all knowledge. Transport has become vastly more rapid and mobile, means of communication by telephone and wireless improve almost day by day, the varieties of amusement have become more and more numerous—in fact, life has become a much more breathless and hectic affair than it was in the days of our parents.

Mr. S. Reginald Price, chairman and past-president of the British Association of Chemists, addressed a meeting of the Notts and Derby Section of the Association, at Derby, on January 19 on "The Future of the Chemist in Industry." Chemists, said Mr. Price, had helped to build up a vast system for the production of goods and the system had already created a demand for an army of chemists undreamt of fifty or even twenty years ago.

The Machine that Cannot Be Stopped

We cannot now stop this machine—we may temporarily check it, but then it only accumulates energy to start renewed. We cannot stop the research worker from carrying on his investigations—research will go on as long as test tubes and crucibles exist and as soon as fundamental facts are discovered, the eager army of workers in applied research will tease and sort the facts till further progress—further production results. The machine which we have created demands applied research, scientific control, chemists and more chemists, physicists, metallurgists, biologists and so on, and consumes them as raw material. Shortly we shall almost certainly add synthetic carbohydrates to the list of staple commodities which the machine can turn out. Synthetic proteins will follow and then we shall have synthetic foods in abundance. We shall produce textile fabrics without calling on the natural cotton or wood as the basic material—in fact we are working to put natural processes in the second place. As the machine grows so it will demand more and more chemists—for research, for control, for analysis and so the cycle will go on.

Why then does not the present demand for chemists exceed the supply? Why are many chemists unable even to get consumed by this machine however much they tempt it? The answer is probably simple, but the cause is not so simple. The machine is not working smoothly—it is back-firing and at times running on two or three of its six cylinders. The rapid progress of industry after the war led to a large output of trained chemists from the universities and technical institutes and this output has been increasing steadily. Some of these chemists unfortunately have seen no hope of industrial positions while others have to-day lost positions which they once had. The present position is a temporary one only. The production machine has had to be slowed down—in fact it has indicated as plainly as possible that it does not approve of the conditions under which it is operating and will, therefore, stop unless something is done to put these conditions right. In a world of vast production, vaster production capacity and almost untold potential capacity, many are on the border line of starvation, many more are merely subsisting while the bulk of the population could only too gladly take more of the products available. The machine has got out of control and the economics suitable for the more placid processes of Nature, of hand labour and of the early days of the machine age, when demand exceeded supply, are not capable of meeting the present situation. The machine can make in a minute may be, what formerly represented a day's work for a man. Thus it begins to put men out of work, it apparently destroys some of the potential clientele and has to begin to halt. Further, it often demands no raw material which has to be worked, where before the demand was great.

The solution of the problem of balance of demand and supply when supply can nearly always be made to exceed demand is bound to lead to new methods of valuation, of work and of leisure, new methods of distribution, new standards of life. Many remedies are being suggested, experiments even on a large scale are being made, but meanwhile and for the last few years, we have been in one of those painful periods of temporary retrogression which are apparently inevitable in any revolution.

This problem of the readjustment of demand and supply will and must be solved. It must be done, or a "machine riot" on a grand scale will certainly follow. Even then we shall not be powerful enough to destroy the machine which we have made—it is taking charge of civilisation and will demand obedience. This demand will help to the solution of the problem. The logical results of the proper solutions of the problem will be a higher general standard of living with all well above the subsistence level, and greater leisure for all. The machine gets into its full pulse again and begins to demand chemists and scientific workers in ever-increasing numbers.

The Chemist and the Solution

The chemist is at any rate partly responsible for the creation of the problem and his responsibility is by no means a small one. Surely in the attempt to solve it, the chemist must take his part and his responsibility. It is only in the last comparatively few years that the chemist has emerged as a properly recognised member of economic society. Surely, scientifically trained men, also versed in practical affairs, for example, in the organisation of a large works, or in charge of a new development, are required and must be called on to take their right and proper place in the councils which will solve the problems and which will direct and control the whole scheme. There is a great need for trained men, with an appreciation of all that scientific production implies in all departments of public life. We have a few, but alas how few—and the future offers an expanding field of utility for the chemist in the control of affairs of State. Let us see that we can produce the men when they are required.

The chemist has helped to build up a vast system for production of goods. The system has already created a demand for an army of chemists undreamt of even fifty or twenty years ago. Temporarily (we hope) something has gone wrong. Demand has not increased as rapidly as the system requires and so also the rate of demand for chemists has fallen off. The problem of readjustment must be solved and

logically can be solved by the co-operation of all the workers that have constructed the system. The solution of the problem and even the start of the machine towards smooth motion again will increase the demand for chemists of all types. This process will be progressive and later in the stage of progress shorter hours of work, which will even apply to the chemist (except perhaps to the worker in pure research who is probably outside any law or system—economic or otherwise) will increase the demand still further.

May this process start very soon. If it does then the power of the chemist for good or evil (may it be generally for good) will increase enormously as it has increased rapidly even in the past forty or fifty years. Let us try to keep our perspective in history and not be unduly depressed by temporary setbacks. The Society of Chemical Industry was founded as lately as 1881, The Institute of Chemistry in 1877, the Society of Dyers and Colourists in 1884, and the British Association of Chemists—the baby—but a very healthy one, in 1917.

Chemists individually and collectively must realise that they have this responsibility and make sure that they use their power for the good of mankind.

A great deal depends on the valuation the chemist puts on his services and on his general outlook on the affairs of his world, not so much financial value, though that is important, to say the least, but his general point of view which he holds towards his science and towards other departments of life. Chemistry is not and must not be only a question of routine and test tubes—it is something larger and it is imperative that the younger chemists who will have much to do with settings things right, should attempt as far as possible to adopt a broad and constructive viewpoint. Specialisation is essential nowadays, but broad principles, common sense and sense of values are even more essential. There will be greater specialisation in the near future. There are brighter signs already. Are these temporary only and local, or will they be progressive?

Investigations at the Chemical Research Laboratory

A Brief Résumé of the Year 1932-1933

THE work of the Chemical Research Laboratory at Teddington during the year 1932-33 is briefly reviewed in the Annual Report of the Department of Scientific and Industrial Research to which reference is made elsewhere in this issue.

In a previous report on the work of the laboratory it was mentioned that a technical improvement had been effected in the manufacture of coal-tar intermediates by means of the large-scale ether extractor which has been developed at Teddington. A Huddersfield firm has since constructed a 500-gallon extractor based on the Teddington model, and is now using this plant for the manufacture of resorcinol, an important intermediate for dyes, drugs and synthetic resins which has hitherto been obtained exclusively by importation. The existing demand for 60 tons of resorcinol per annum can now be met by this firm, its extraction plant being capable of a yearly output of 100 tons.

All sections of the laboratory benefit from the special attention which is given to the technique of high-pressure apparatus; as, for example in quantitative experiments on corrosion in compressed oxygen, in researches on the amination of alcohols and phenols under pressure carried out in connection with investigations on tar and on synthetic resins.

Utilisation of Tar Products

A notable application of the study of various tars has arisen in connection with wetting agents in the mercerising of cotton. Certain tar acids derived from tars from vertical retorts and low temperature tars have been prepared and tested for wetting out properties in collaboration between the Shirley Institute and the laboratory. A product has now been obtained and standardised under the name "Shirlacrol," and is being manufactured commercially.

Condensation of low-temperature tar fractions with formaldehyde have been made on a semi-works scale, and the resulting resins have been tested industrially in the impregnation of paper cones. Similar resins of heat hardening type have been made up into laminated board which has been subjected to mechanical and electrical tests.

In regard to water pollution, work has been in progress on the preparation and testing of base exchange materials prepared from English clays. A comprehensive monograph on plumbosolvency is now going through the press.

In the search for drugs efficacious in the treatment of African sleeping sickness, two series of organic arsenicals have been investigated: (1) Derivatives of fluorenone and fluorenol containing arsenical groups which have in certain instances exhibited activity against trypanosomes; (2) derivatives of *p*-arsanilic acid having the general formula $AsO_3H_2.C_6H_4.NH.CO[CH_2]_nCO.NRR'$ some of which are at least as potent as tryparsamide in the treatment of infected mice.

Chemical investigation has been directed towards a study of the influence of the constituents on the physical properties of tar; the resinoids appear to be important in this connection and and sub-divisions of this class are being examined. Information is being accumulated on the influence of various agencies on the weathering of tar. Preliminary experiments in which pitch was isolated from crude tar by means of light petroleum have given promising results, and an apparatus for conducting the process in safety is being erected.

Chemical Engineering

The dehydrogenation of pyridine has been examined in detail and a considerable amount of 2 : 2′-dipyridyl has been prepared. A new triamine, 2′ : 2 : 2″tripyridyl, recently discovered at the laboratory has been obtained in larger quantities and certain of its reactions have been studied.

Work on phenanthridine has been continued chiefly in the direction of preparing derivatives for therapeutic tests. Compounds of the type of the antimalarial, atebrin, with a phenanthridine nucleus replacing an acridine have been submitted, but more promising results have been obtained with certain quarternary salts which have been shown by Professor Browning, of Glasgow University, to possess noteworthy antiseptic properties.

Arrangements have been concluded through the agency of the Association of British Chemical Plant Manufacturers whereby high-pressure autoclaves and other types of high-pressure chemical plant to the designs of the laboratory are being made and marketed by Hadfields, Ltd., of Sheffield. In order that the range of pressure may be extended, an autoclave and accessories for pressures of 3,000 atmospheres is in course of construction, with an internal capacity of 120 c.c. The laboratory has also been of assistance to the Distillers Co. (Research Laboratories), Epsom, in certain investigations involving the use of high pressure at elevated temperature.

Research in Microbiology

A survey of the researches in which microbiology played a part, led the Chemistry Research Board to consider the desirability of having a laboratory for general microbiological research. The Board felt that microbiology would strengthen the chemist in his attack on many of the industrial problems awaiting solution and might lead to developments comparable with those that have followed on the recent introduction of what may be called high pressure chemistry. Accordingly steps have been taken during the year under review for the addition of such a section to the organisation of the Chemical Research Laboratory. The staff of this section will be provided by Dr. A. C. Thaysen and those of his collaborators who have been engaged, hitherto at the Royal Naval Cordite Factory, on investigations conducted on behalf of the Fabrics Research Committee into the destruction of fabrics by micro-organisms. Accommodation having been found for them, they will work on problems selected by the Board.

Chemical Conditions and Prospects in India

Increased Imports of Heavy Chemicals

SIR THOMAS M. AINSCOUGH, the senior British Trade Commissioner in India and Ceylon, states in a report on "Conditions and Prospects of United Kingdom Trade in India" issued by the Department of Overseas Trade (H.M. Stationery Office, price 3s. 6d.) that one of the most encouraging features of the past few years has been the steady advance in the imports of heavy chemicals in face of all obstacles such as enhanced import duties, political agitation and the "swadeshi" movement. This development reflects the progress which is being made in those Indian industries in which chemicals constitute a valuable raw material of manufacture. It also reflects the efficiency of the intensive sales and service campaigns of the rival United Kingdom and German groups. Although there was a slight setback in 1931-32, the total values for the past year have only once been exceeded (in 1929-30) and are three times as great as those of the average of the last five pre-war years. The total imports were :—

	£
1927-28	1,980,000
1928-29	1,860,000
1929-30	2,092,500
1930-31	1,957,500
1931-32	1,927,500
1932-33	2,032,500

The following statement shows the percentage share of the principal countries of consignment over a series of years covering both the pre-war and post-war periods :—

	1913-14 (pre-war year)	1914-19 (war average)	1930-31	1931-32	1932-33
	%	%	%	%	%
United Kingdom	74.7	70.4	54.0	54.8	51.6
Germany	12.4	0.7	18.3	18.1	14.9
United States	0.3	5.5	5.2	4.6	5.4
Italy	5.2	2.8	7.3	5.9	5.6
Kenya Colony	—	0.3	2.3	1.5	1.6
Norway	0.5	0.5	1.6	0.8	0.3
Japan	1.5	16.7	1.7	2.3	4.9
Other countries	5.4	3.1	9.6	12.0	15.7

A Satisfactory Recovery

The recovery in the United Kingdom position during the past couple of years is eminently satisfactory and partly results from increased imports of sodium carbonate (soda ash and soda crystals) and caustic soda, both of which are United Kingdom specialities. Imports from Russia of sodium carbonate amounted in 1931-32 to £41,250. In the same year £3,750 worth of Russian caustic soda was imported. Though these imports from Russia have not yet assumed large proportions, they have had a disturbing effect on the market. Japan is now manufacturing increased quantities of soda compounds and competition from this source is likely to increase. Imports from Germany cover almost the whole range of chemicals and competition from the German "I.G." group working through the Havero Trading Co. is very keen. Italy supplies most of the imports of sulphur. The following table gives particulars of the total imports under each of the principal headings during the past two years :—

	1931-32	1932-33
	£	£
Acids	63,750	58,125
Bleaching Powder	73,125	71,250
Carbide of Calcium	56,250	54,375
Copper Sulphate	22,500	22,500
Disinfectants	52,500	52,500
Glycerine	18,750	22,500
Potassium Chlorate ...	60,000	86,250
Sodium Bicarbonate ...	60,000	60,000
,, Carbonate ...	463,125	485,625
,, Cyanide ...	26,250	24,375
Caustic Soda	236,250	255,000
Sodium Silicate	16,875	15,000
Sulphur (Brimstone) ...	120,000	146,250

By the Heavy Chemical Industry (Protection) Act, of 1931, protective duties at different rates were placed upon certain specified chemicals manufactured in India subject to the proviso that these protective duties (other than that on magnesium chloride) should have effect only up to March 31, 1933. After further investigation of the position, the Government of India stated, in a resolution dated April 1, 1933, that "the chemical industry in India can have no future so long as manufacture is carried on in small units with low production, and no indication has appeared of any desire on the part of existing manufacturing interests to concentrate production into a small number of economic units for the supply of the existing market. In these circumstances, the only result of continuing protection to the heavy chemical industry would be to perpetuate uneconomic manufacture and to place a burden on the consumer of such chemicals for an indefinite period with no prospect of any national advantage. The Government of India accordingly decided to place no proposals before the Legislature for the continuance of protection to the heavy chemical industry after March 31, 1933. The protective duty on magnesium chloride, which is in force until March 31, 1939, remains unaffected by this decision." The discontinuance of these protective duties should give a valuable stimulus to the import trade and will remove a retarding feeling of uncertainty as regards indigenous production.

Result of the Ottawa Conference

At the Ottawa Conference, 1932, it was agreed that a preferential rate of 10 per cent. should be applied to the following chemicals of United Kingdom production—tartaric acid; other acids (except acetic, carbolic, citric, oxalic and tartaric); anhydrous ammonia; other ammonia and salts thereof; disinfectants other than naphthaline; bichromate of potassium; potassium compounds, others sorts (except chlorate and cyanide); bichromate of soda; cyanide of sodium; caustic soda; sodium carbonate (soda ash and soda crystals); other soda compounds (except bicarbonate, borax and sodium silicate); all other sorts of chemicals (except those indicated above as separately distinguished and except alum, arsenic, calcium carbide, glycerine, lead compounds, ferrous sulphate, magnesium compounds, sulphur and zinc compounds).

This valuable fiscal concession should materially increase the United Kingdom share of the trade and its effects will be watched with great interest.

Dyestuff Imports

The imports of dyeing and tanning substances were as follows :—

	1931-32	1932-33
	£	£
Alizarines—		
Dry	2,197	2,216
Moist (not exceeding 16%)	7,500	15,000
,, (over 16% but not exceeding 20%)	90,000	82,500
,, (exceeding 20%)	37,500	30,000
Aniline	1,417,500	—
Congo red	—	82,500
Coupling dyes of the naphthol group—		
Naphthols, rapid fast colours (rapid salts) and bases	—	225,000
Other sorts	—	82,500
Vat dyes—		
Indigo	90,000	120,000
Other sorts—		
Paste	—	60,000
Powder	—	300,000
Sulphur black	—	82,500
Metanil yellow	—	30,000
Auramine of concentration of 15% and less	—	7,500
Rhodamines (Carthamines) of concentration of 15% and less	—	2,205
Aniline salts	—	7,500
Others	112,500	502,500
Total of dyes obtained from coal tar ...	1,747,500	1,627,500

The United Kingdom is now firmly established as the second main supplier of dyestuffs to India. She is still overshadowed by the German "I.G." group, but the progress made in recent years has been most encouraging and is likely to continue.

Electric Arc Welding in the Chemical Industry

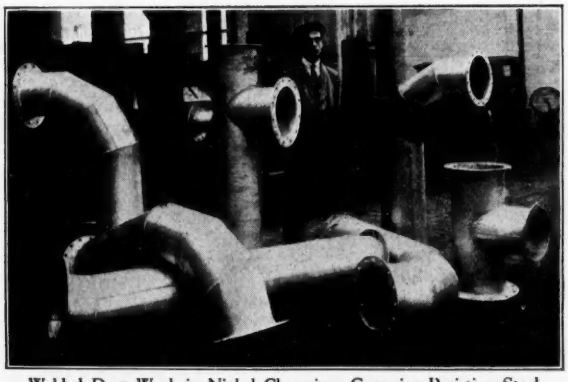
Fabrication of Vessels in Stainless Steel and Monel Metal

WITH the advent of specially constructed plant in the chemical industry, there has arisen an increased application of the various welding processes, *viz;* oxy-acetylene welding, resistance welding and metallic arc welding. This article concerns the latter.

There are on the market to-day, a whole range of stainless alloys containing chromium, nickel, molybdenum and other elements which are very resistant to chemical attack and which have replaced the lined tanks. The corrosion resisting properties of chromium steel were discovered in England just before the war, mainly owing to the efforts of Sir Robert Hadfield and Mr. H. Brearley. Almost at the same time the chemists of Krupp's, in Germany, were experimenting on the same lines, and an exchange of patents took place between several firms in this country and abroad. These steels have now become known commercially as stainless steels. It is entirely owing to the introduction of stainless alloys that many chemical reactions are made simple and safe, as in the past the vessels then in use were not reliable.

The question of design is important when dealing with the welding of fabricated articles manufactured with stainless steel and other alloys, but of paramount importance is the question of the choice of a suitable electrode for undertaking the welding work required.

In the welding of alloys of all descriptions many problems have had to be solved. It is not so very long ago—a mere matter of twenty years or so—that welders were compelled to admit that the welding of alloy steels was beyond them. In those days it was only possible to weld mild steel satisfactorily, the welding material being what was termed "Swedish iron." Any material which contained anything beyond a very small percentage of carbon could not be used. The coming of the electric arc altered the position very materially. The intense heat of the arc simplified much of the work, but it has created problems of its own, since the intense heat has a way of creating fresh compounds with, from the welder's point of view, very inconvenient results.

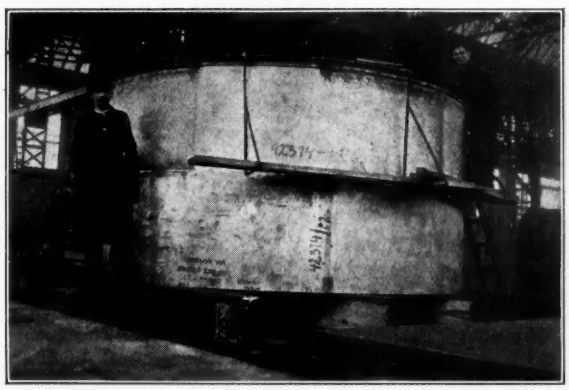


Welded Duct Work in Nickel Chromium Corrosion-Resisting Steel. (By courtesy of Thos. Firth and John Brown, Ltd.)

Much had been done to overcome the difficulties of welding alloys by the predecessor of the Murex Welding Processes, Ltd. Since 1918 the welding of alloys of all descriptions has received constant and unremitting attention, until to-day it is possible to weld satisfactorily all classes of alloys, both ferrous and non-ferrous. One of the principal difficulties which is experienced in the welding of alloys of all kinds is due to the segregation of the metals forming the alloys, which gives rise to porosity. Such troubles rarely occur when the alloy is first formed.

A very valuable addition to electrodes for welding stainless alloys is a percentage of nickel. Nickel is added by a process of electro-deposition which enables the manufacturers to vary the amount of nickel required. It is also necessary to include a suitable flux, and therefore it is absolutely essential for manufacturers to insist upon the right type of electrode for the work required. The principal makers of electrodes are able to guarantee within very close limits that an electrode can be supplied which will deposit metal of the same specification as the present material.

If satisfactory results are to be obtained in the welding of these steels, it is essential that the metal deposited in the weld should comply precisely and exactly with the specification of metal being welded. Unless such results can be achieved, failures are bound to occur. A certain amount of difficulty occurs in the welding of certain steels, resulting



Welding in Progress on Third and Fourth Tier of Storage Tank using Lap Welded Seams.

from the effect of the welding heat upon the crystal structure of the plate in the adjacent zone. It is therefore advisable to consult the makers of the steel used before carrying out any extensive welding work or to communicate with the manufacturers of electrodes who will be most pleased to give advice on matters of this kind. Either A.C. or D.C. plant can be used in the welding of chrome nickel steels, but with the former the best results are obtained with a plant with an open circuit voltage of 100. Owing to the finer current regulations usually obtainable, the D.C. plant should be used where available.

The actual welding of these steels should be no more difficult than working on mild steel, but it is essential that the metal should not be kept in the molten condition for too long a period by making exceptionally wide runs. It is, however, important at the end of a run to trail the arc away from the weld in order to avoid porosity if the electrode is lifted away; this is even more important when dealing with stainless steel. By maintaining a short arc and depositing narrow beads the effects of oxidation by the atmosphere are very slight.

Smaller gauges of electrodes and lower current strengths than for welding mild steel should be used, and it is also necessary to spend more time in setting up the work. The general rules for avoiding distortion, such as leaving a gap at the bottom of the joint, allowing the seam edge to diverge from the starting point of the weld, avoiding, if possible, the welding together of unequal thicknesses and extra care in preparation of joints should be adhered to. A short description of articles fabricated by welding and made of the above mentioned steels should not be out of place.

Products fabricated by electric welding constructed with various types of stainless steel are legion. They extend from large chemical plant down to small articles of domestic use. In the manufacture of such products there are a number of engineering concerns who have specialised in this work for a number of years, and who have established a high reputation for the finished quality of their manufactures. Such products include pipes for conveying concentrated acids, mixing vessels and pans for the preparation of food, and

stainless steel tankers mounted on motor chassis for the conveyance of milk.

The accompanying illustrations depict a number of products made from corrosion resisting steels, which have been fabricated by the electric arc welding process.

In addition to the various stainless steels and alloys mentioned above, welding is now used considerably in fabricating articles with monel metal. One of the outstanding advantages of welded construction in monel metal and pure nickel is that the corrosion resistance of the weld if successfully carried out, is practically as good as that of the parent metal. Electrodes with a core of monel metal are now used for repairing castings made of cast iron. An entirely new departure is the welding of nickel clad steel parts made in this material to have an unbroken nickel surface, and continuity is obtained with nickel.

From the above it will be seen that with the exception of aluminium, electric arc welding can be successfully used for the construction of products made in various stainless steel and alloys.

Continental Chemical Notes

NEGOTIATIONS ARE REPORTED to be proceeding between the Soviet authorities and Italian firms in connection with the supply of plant for the proposed rayon factory in the Caucasus.

* * *

A NEW NITROGEN COMBINE, which it is proposed to establish at Tschirtschik, will supply one-half of the artificial fertiliser requirements of Russian Central Asia.

* * *

CLAIMS FOR PRIORITY IN THE DISCOVERY of the new infra-red photographic sensitisers are advanced by the I.G. Farbenindustrie, according to the "Chemiker-Zeitung," January 17.

* * *

A CEMENT-LIKE BUILDING MATERIAL which is resistant to putrefaction, can be cut with a saw, is fire and frost resistant, and contains no ingredients injurious to metals, has been compounded by the I.G. Farbenindustrie from a mixture of "Iporit" (a foaming agent) and any normal cement (with the exception of fused cement).

* * *

ANOTHER WOOD CARBONISATION PROJECT is to be erected at Axelvik, Sweden, with the aid of a long-term state loan of 950,000 kronen. The process of Dr. Rinman will be applied, using waste wood products of all descriptions. An annual output of 12,000 tons is anticipated, including acetone, methyl ethyl ketone and other solvents, as well as heavy oils. Hydrogen will also be manufactured to the extent of 600 tons.

* * *

A SIMPLIFIED PROCESS FOR TREATING PEAT with a view to production of good quality cellulose pulp is based upon preliminary disintegration of the cell walls by refrigeration. As outlined in the January issue of "Kunststoffe," the peat (after removal of earthy accretions) is compressed to block form, frozen, comminuted by rubbing, and the finely divided well-disintegrated peat pressure-digested, if necessary in presence of caustic soda, sodium sulphite or sodium sulphate. A chlorine bleach and final wash completes the series of operations. It is pointed out that pressure and boiling period should not exceed limits beyond which cellulose is degraded and amount on the average to 2 atm. and 1 to 2 hours respectively. Slow cooling of the batch is advisable. Chemical digesting agents, if at all necessary, should only be present in very dilute solution in conjunction with relatively low pressure and short boiling period.

* * *

ACETALDEHYDE CAN BE USED as a source of ethyl acetate on the technical scale, an 80 per cent. yield being claimed for the process involving condensation in presence of dehydrated aluminium butyl alcoholate developed by the Russian chemists Kagane and Sobolev. As outlined in "Revue des Produits Chimiques," December 15, 1933 (page 719), the high yield obtained depends upon working under completely anhydrous conditions. The aldehyde is reacted in the form of paraldehyde which is readily dehydrated with sulphuric acid, while aluminium butyl (or amyl) alcoholate is preferable to the ethyl alcoholate owing to the greater facility with which the higher aliphatic alcohols can be dehydrated. Another interesting feature of the process is the employment of aluminium of only 98 to 99 per cent. purity, since perfectly pure aluminium does not react with alcohols. Condensation to ethyl acetate is carried out at a temperature of 25 to 40°C. over a period of 2 to 3 hours.

RECENT DEEP BORING OPERATIONS for petroleum conducted by the Wintershall A.G., have been attended with success and the monthly crude oil output in the Nienhagen district has risen to 3,000 tons.

* * *

AN EXTRAORDINARY GENERAL MEETING of the Deutsche Petroleum A.G., has authorised purchase of the Rositz Mineral Oil Refinery which has been engaged for some years in the extraction of oil from lignite tar.

* * *

EXCEPTIONALLY GOOD AROMA is said to distinguish the 1933 peppermint crop in the Palatinate, where the Speyer district is the principal centre of this industry. About one-fifth of the estimated yield of 150 centners originates from Mitchamstock mint imported two years ago.

* * *

THE ANTIMONY MINE AT GENEST, the property of the Compagnie des Mines de Lucette, is reported to be worked out, but smelting operations will not be interrupted since ore will continue to be supplied from the company's Moroccan mines at Ain-Kerma.

* * *

PURE PHOSPHORITE (calcium phosphate) in the officially estimated minimum quantity of 150,000 wagons will be available from the deposits located last summer at Prambachkirchen in Austria. A considerable proportion will enter the export market.

* * *

A CONSIDERABLE WOOD CARBONISATION INDUSTRY now exists in French Cochin China (reports "Chemische Industrie"), but no incentive exists towards isolation of acetic acid or other by-products. The wood charcoal commands an exceptionally favourable price on the Bangkok, Singapore and Hongkong markets.

* * *

PLANS ARE AFOOT for the establishment of a wood saccharification concern with which the municipality of Regensburg will be actively associated, reports the "Frankfurter-Zeitung." Work will be provided for four to five hundred men and the range of products, in addition to lignin and cattle feed, will include fermentation products such as ethyl alcohol, glycerin and acetone.

* * *

GOOD RESISTANCE to the usual liquids employed in the viscose industries (rayon and transparent paper) is shown by rubber-lined plant, synthetic resins of the Haveg type and plant coated with specil resistant metallic alloys. A considerable proportion of the iron portions of viscose plants are still guarded against corrosion, states F. Ohl ("Metallbörse," November 1), with coatings of high melting bitumen and asphalt preparations with or without graphite. A double coating is advisable and will generally require renewal after not more than 2 to 3 years. The subsequent cost of renewal will depend upon the degree of corrosion which the iron surface has undergone during that period, for in bad cases a thorough stripping of the surface will be required. This is a comparatively expensive operation, the ratio of cleaning, painting and material costs being given as 20 : 5 : 3 to 3.5. Another anti-corrosive scheme which is sometimes favoured in the rayon industry comprises one coat of a red lead primer followed by two coats of red oxide of iron paint. In this case the corresponding figures are 20 : 7.5 : 2.8 to 3.

Death of Professor W. E. Gibbs

Ramsay Professor of Chemical Engineering at London University

HIS many friends in the world of chemical engineering will learn with deep regret of the death of Professor William Edward Gibbs, D.Sc., Ramsay Professor of Chemical Engineering at University College, London, which occurred on January 18, at the age of 44. Professor Gibbs was the son of the Rev. W. H. Gibbs, and was educated at Liverpool Institute and Liverpool University. At the age of 22 he was appointed assistant chemist to the Straits Trading Co. at Singapore, but in 1914 he returned to Liverpool University as a lecturer in metallurgy and investigator to the Corrosion Committee of the Institute of Metals. In 1916 he was appointed chief examiner of the Aeronautical Inspection Department, and in 1917 he went to Southampton as chief chemist of the Government Rolling Mills. Then from 1918 to 1928 he was chief chemist of the Salt Union at Winsford, Cheshire.

The late Professor W. E. Gibbs

Professor Gibbs's special charge at University College was the Ramsay Memorial Laboratory of Chemical Engineering. The laboratory was instituted in 1923 as a tribute from friends, colleagues and students to the great work achieved by Sir William Ramsay, F.R.S., during his tenure of the chair of general and inorganic chemistry from 1887 to 1913. The development of the department under the first Ramsay Professor, Dr. E. C. Williams, was watched with great interest, and in 1928 the established success of the department prompted a committee representing chemical industry and education, and presided over by the late Lord Melchett, to appeal for funds with which to erect a special laboratory better suited to the growing needs of the department, and also to provide an annual income sufficient for its requirements. In response to the appeal, a number of leading firms in the chemical industry generously contributed a capital sum of over £26,000 and also guaranteed an annual income of £4,000 for a number of years. The outcome of this effort was the opening of the present laboratory by Prince George in November, 1931, on which occasion Professor Gibbs was one of those who were presented to His Royal Highness. Since that time, he has done valuable work in the educational interests of chemical engineering.

Professor Gibbs was the author of "The Fishing Industry," "Clouds and Smokes," "The Properties of Disperse Systems in Gases," and "The Dust Hazard in Industry." He married in 1918 Nellie Clare Newman, and had three sons and one daughter.

The funeral service was at the Methodist Church, Coulsdon, on Saturday, and the interment at Coulsdon Parish Church.

An Appreciation

The late Professor Gibbs combined to an unusual degree qualities of mind with qualities of character. His death, in the prime of life, at the height of his powers, is a grievous loss to chemical engineering and a tragic bereavement to his many friends. He will doubtless best be remembered by the work of his later years in his association with University College and the department which owes its present development so largely to his creative enthusiasm and wise leadership. "Si monumentum requiris, circumspice." To few men is given a like memorial.

"What a very human professor!" remarked one visitor to the College after meeting him for the first time. His human qualities were much in evidence in his relationships with his students, to whom he was not only a wise philosopher but also a sympathetic, if candid, friend. At the informal dinner given in his honour last year by past and present students of the department it was obvious that he was one of them, not merely one set above them. His influence on them at the important stage of completing their academic education just before entering on their industrial career was of inestimable value not only as regards technical training but in moulding of character. He endeavoured to teach them to observe carefully, think clearly and judge wisely. Himself fertile in ideas, he was receptive to those of others and willing to discuss them without preconceived opinions and to welcome criticism. At times his keen sense of humour would lead him to pursue an idea with a twist of light fantasy and smilingly produce an absurd conclusion in the "best scientific manner." His personal charm was also of great value to his department in that it enabled him to enlist the helpful interest of outside people and maintain that contact with industry that he considered so essential for his students.

Those who were privileged to know him more intimately and who realised his devotion to his family will feel particular sympathy for them in their bereavement.

> "His life was gentle, and the elements
> So mix'd in him that Nature might stand up
> And say to all the world 'This was a man!'"

Mono-Azoic Dyestuffs and Lake Colours

Post-War Developments

DURING post-war years, tremendous strides have been made in the production of mono-azoic dyestuffs and lake colours, said Mr. A. H. Whitaker, in a paper read before the local branch of the Oil and Colour Chemists' Association, at the Manchester School of Technology, on January 12. With improvements in quality, brightness, strength and texture, the colour industry in this country now occupies a position which is at least equal to the premier Continental countries. These mono-azoic dyestuffs belong to the group of azo-compounds which generally are prepared by the inter-action of a diazo salt with an aromatic-hydroxy-compound. They can be divided into two classes (a) amido-azo compounds, of which amino-azo benzine is the simplest, and (b) oxy-azo compounds, of which perhaps the best example is Para Red.

Ponceaux dyestuffs were amongst the first reds to be made by the manufacturer of pigments or the dyestuffs manufacturer who prepared dyestuffs for a pigment manufacturer. These were prepared by the diazotisation of either mixed xylidine or meta xyliline, which diazo body is then coupled on to "R" Salt, the resultant soluble dyestuff when converted to the barium salt, gives a lake which is non-bleeding in spirit which property of course considerably enhances its value. Other red dyestuffs which are used by the lake manufacturer are the Acid Scarlet series, Acid Oranges, Acid

Bordeaux, Acid Carmines, which are prepared by using as diazo component aniline, toluidine, alpha naphthylamine and their sulphonic acids, and as coupling component, beta naphthol and its sulphonic acids. Lakes from these dyestuffs are usually made by converting them either into co-precipitated alumina blanc fixe lakes, or into barium lakes on suitable substrata, and to-day these precipitated colours find their chief uses as pastes containing 30/60 per cent. of solids, according to the amount and quality of the base required, and are used in the paper coating trades. They yield bright colours, are comparatively cheap, but their fastness to light properties are distinctly limited.

Easily Soluble Mono-Azoic Dyestuffs

Perhaps the most important of all easily-soluble mono-azoic dyestuffs is Pigment Scarlet 3B. This dyestuff is made with very little difficulty, and is produced by the diazo compound formed when anthranilic acid is diazotised, and then coupled on to "R" Salt. The usual method of laking this product is by precipitating the dyestuff in the shape of its barium salt, on to a base containing both alumina and zinc oxide with a fairly high proportion of Turkey Red oil. The lake is struck at a comparatively low temperature, not more than 50° C. Of recent years, many colour manufacturers have been able to produce a concentrated scarlet 3B Lake with a minimum amount of base, but manufacturers have a long way to go before we reach the quality of the super-concentrated Scarlet 3B Lake produced by the Americans. Lakes made from Scarlet 3B are exceptionally fast to light, and are used in paint, printing ink, and also largely in cellulose lacquers on account of their non-bleeding properties.

The most important insoluble reds in the mono-azoic series are Para Red and Helio Red. The former is made by coupling para-nitranaline with beta-naphthol and a wide range of shades can be obtained by variation of the diazotisation temperature and coupling temperature. There is a limit, however, to the stability of the diazo, and if temperature is raised, acid must be increased. Other precautions to be taken are, introduction of the requisite nitrite all at once, and ensuring that there is a slight excess of nitrous acid until coupling is completed, otherwise formation of the diazo amino compound occurs with ruinous results to the batch. Various shades of Para Red can be obtained by the use of Beta Naphthol R and the discreet use of Turkey Red oil, or any other suitable disperser. The use of Para Red in the paint trade, however, has diminished of recent years owing to its heavy bleeding in oil, though some makers are able to produce a Para Red with the minimum amount of bleeding. Of course, the bleeding diminishes too when the dyestuff is struck on suitable substrat. Large quantities of the reduced forms are still used in the paint trade, especially the colour struck on orange lead. Again, despite the bleeding property and owing to its good straining power, fairly good fastness to light properties and comparative cheapness, Para Red and its lakes like Lithol Red, is sure to be fairly extensively used in the paint trade, and as pulps in the paper coating trade for many years ahead.

Lake Colours from Basic Dyestuffs

Lake colours prepared from basic dyestuffs are sub-divided into several different groups. The chief precipitants used for basic dyestuffs are tannic acid, tannin, tartar emetic, resin soaps, Tamol and Katanol (which are synthetic precipitants offered by the I.G.) green earth and white earth, arsenic and acid dyestuffs.

Methylene Blue, when precipitated with a dyestuff like Acid Alizarine Blue, yields Helio Marine. This is a colour which has good fastness to light properties and is quite a good substitute for Prussian and Bronze Blues, but of course, it is very much more expensive. It is used to a large extent in paint and cellulose enamels. Green earths has the remarkable property of absorbing basic dyestuffs, and imparts quite good fastness to light properties to the resultant colour. These types of lakes are usually used in distempers. Owing to the fastness properties when using green earth and white tain the lake. The resultant colours were slightly brighter the original work on the Fanal colours. These colours have in the past few years revolutionised the colour trade as far as basic lakes are concerned. When first introduced by the I.G. they were offered as soluble colours, which simply needed the addition of a precipitant on suitable substrat in order to obtain the lake. The resultant colours were slightly brighter and faster than the ordinary types of basic lakes, but were so expensive that their extensive use was precluded. Of recent years, chiefly due to the efforts of one British colour firm, a complete range of highly concentrated brilliant and fast to light colours has been introduced, having good fastness to light properties. They are used in printing ink, for paper coating work, and in other trades. The method of operation consists in treating a solution of basic dyestuffs with a complex acid such as phospho tungstic acid or a phospho tungstic acid containing selenium.

Two inorganic blues, *viz.*, Prussian blue and ultramarine blue have never been entirely successfully imitated by organic lake colours. They both are comparatively cheap and generally have excellent fastness to light properties. Prussian blue has only limited straining power, and ultramarine blue has less. Moreover, the former is sensitive to even minute traces of alkali and the latter to minute traces of acid. Because of the objectionable properties mentioned, efforts have been and are continually being made, with a view to imitating them with lakes made from organic dyestuffs. Helio Marine as already mentioned and Indanthrene Blue GGSL (I.G.) are probably the best imitations for Prussian blue and both possess excellent fastness to light properties. Indanthrene Blue GGSL is an anthraquinone derivative, and is a remarkable colour which can be safely recommended for almost any trade where colour is required.

Alizarine Lakes

In the anthraquinone class are the lakes prepared from the alizarine dyestuffs. Alizarine, has been accepted in this country at any rate, as a standard for fastness to light. The lakes from the dyestuffs are generally manufactured in a wooden vat free from metallic contamination. The materials used, depend to some extent upon the desired shade. Alumina and phosphate are always present, together with a disperser such as Turkey Red oil. The lakes in pulp form are used to some extent by paper coaters, and in the dry form, in paint, printing inks and also by artists colour manufacturers. There is a variety of shades available from orange to Bordeaux red. The self-colours in oil of the pure lakes are not particularly attractive, but they are pleasing colours when reduced to tints. In this range there is also a series of soluble dyestuffs offered by the I.G. known as Helio Fast Rubines, named by them 2BL, 3BL, 4BL and 6BL. These lakes are produced by absorption on alumina and the shades are distinctly attractive and rich colours, varying from a cochineal carmine shade in the case of the 2BL, to a deep rich magenta in the case of the 6BL.

Speaking of extenders and dispersers, Mr. Whitaker said a varied assortment of these are now available. A number are offered for sale by the larger dye manufacturers, by agents representing Continental manufacturers, and dye combines and in some cases they are made by the lake manufacturer himself. They should really be divided into two classes. Dispersers, the first class, may consist of complex compounds of naphthalene sulphonic acids or sulphonated fatty alcohols or preparations from them are used for dispersing the colour particles, that is, for assisting the solubility of a slightly soluble dyestuff, or a dyestuff only soluble with difficulty, or dispersing the lake particles in the finished colour in paste form, and in many cases getting better strength value than would be the case if they were not used, but at the same time having very little or no effect on the finished yield of the lake colour. The second class, dispersers cum extenders, consist chiefly of soaps, such as one prepared from resin or linseed oil, and not only help materially with the better dispersion of the actual dyestuff particles, but increase brilliancy, strength and yield. These should be used with great discrimination. In the case of the insoluble pigmentary colours in the mono-azoic series, better colour value can nearly always be obtained with increased fastness to light properties, by striking the actual dyestuff on the requisite base, than by dry grinding in the base. In a few cases the colour is developed by grinding in the base, but these are in the minority. In very many cases, by dry grinding in a base, particularly a crystalline one such as barytes, the colour becomes dirtier and loses a good deal of its richness.

Notes and Reports from the Societies

Ninth International Congress

Madrid, April 5-11, 1934

THE ninth International Congress of Pure and Applied Chemistry will be held in Madrid on April 5-11, under the patronage of H.E. The President of the Spanish Republic and of the Spanish Government. The object of the Congress, which was to have been held in 1932, is to promote the progress of pure and applied chemistry, and to strengthen relations between chemists throughout the world. The president of the bureau of the Congress is Professor Obdulio Fernández, and the general secretary is Professor Enrique Moles; the address of the organising committee's office is San Bernardo 49 (P.O. Box 8043), Madrid (8).

Membership is of three categories: honorary members, comprising the committees of honour and of patronage, and the official delegates of the Spanish Government and of the governments of other countries; supporting members, who pay the minimum amount of 300 pesetas; and active members who pay a fee of 75 pesetas (about £1 17s. 6d.). Membership is open to societies and institutions connected with any branch of pure or applied chemistry, and to individuals interested therein. Applications for membership should be made to the general secretary before February 15, 1934, and should be accompanied by a remittance made payable to the treasurer. Pamphlets, containing the rules of the Congress, and other information can be obtained in England from Mr. S. E. Carr, The Chemical Society, Burlington House, Piccadilly, London, W.1.

The groups and sections have been organised as follows: (1) Physical and Theoretical Chemistry, pure (electrochemistry, photochemistry), applied (colloid chemistry, rubber, tanning and leather materials, electrometallurgy); (2) Inorganic Chemistry, pure, applied (glass, ceramics, cement, mineralogy, metallurgy); (3) Organic Chemistry, pure, applied (colouring materials, explosives, sugars, starches, cellulose, paper, fats, oils, soaps, colours, paints, varnishes); (4) Biological Chemistry, pure, applied (medical and pharmaceutical chemistry, fermentation industries); (5) Analytical Chemistry, pure, applied; (6) Agricultural Chemistry; (7) History and Teaching of Chemistry, Economics and Chemical Legislation. Papers may be in the language with which the author is familiar; summaries must be given in English, French, German, Italian or Spanish. Scientific communications intended for the Congress should be forwarded by February 5, 1934. The Congress will comprise general lectures; lectures, followed by discussions, in the various groups; and original communications. The general lectures will deal with mineral chemistry, organic chemistry and biochemistry.

The Chemical Society

Bristol: Reaction in Solids and Gases

THE induction period in solid reactions was dealt with by Professor W. E. Garner in a discussion on "Reactions in Solids and Gases," held by the Chemical Society at Bristol University, on January 26. Solids when heated decompose at rates which accelerate with time, and a number of solids such as barium azide only decompose at an appreciable rate after a very marked induction period, said Professor Garner. An induction period makes its appearance when the rate of reaction varies with the time to a high power. For fulminate crystals, this power is 20 to 25 and for barium azide about 10 and both these substances show very obvious induction periods. Where the rate varies with the time to the second or the third power, the induction period is replaced by a slowly accelerating rate of reaction as with lead azide, lead styphnate and ground mercury fulminate.

The acceleration of the rate of reaction is associated with the phenomena of centre formation. On account of the close packing of crystalline lattices, molecules or ions within a crystal lattice require higher temperatures for their decomposition than molecules or ions on the edges, corners and surfaces of the crystal. Thus it is invariably observed that decomposition occurs first on crystal surfaces or on discontinuities with the crystal. In the majority of solid reactions, decomposition is accelerated by the solid products so that centres of decomposition are formed which spread over the surfaces of the crystal. The causes of the above-mentioned induction periods are to be sought in the manner in which these centres increase in number with time, and in the rates at which they grow when formed.

An investigation into the rate of centre formation on dehydrating unscratched crystals of copper sulphate pentahydrate, said Professor Garner, has shown that there is an induction period during which no centres are formed; after which the number increases linearly with time. For barium azide also, no visible centres can be seen during the induction period. The induction period is thus an interval during which either (a) the centres grow very slowly or (b) the surface is being prepared for centre formation. The evidence so far obtained supports the first alternative although the question has not yet been definitely settled.

The acceleration of a solid reaction has been shown to be mainly dependent on two factors, (1) the acceleration of the growth of the centres which occurs when they are small, and (2) by the increase in the surface area of the centres with time. The latter factor alone is only capable of accounting for rates varying with the time to a power 2-3, and the former must be mainly responsible for the long induction periods met with in copper sulphate pentahydrate, barium azide and mercury fulminate. The most probable cause of the acceleration in the growth of a centre of decomposition is the "block" structure of crystalline solids (Smekal blocks or irregularities of crystalline growth). The centres would be expected to grow uniformly in homogeneous solids but if the reaction meets with discontinuities in its path, then there would be expected a non-uniform branching growth such as that which governs plant growth, such as the growth of duckweed. It is therefore concluded that the main factor operating in producing induction periods in solid reactions is the unrestricted branching growth of centres of decomposition.

Chemical Engineering Group

Recovery of Benzol by Activated Carbon

A JOINT meeting of the Chemical Engineering Group and the London Section of the Society of Chemical Industry will be held in the Chemical Society's Rooms, Burlington House, London, on Monday, February 5, when a paper on "The Recovery of Benzol by Activated Carbon" will be presented by Mr. H. Hollngs, M.Sc. and Mr. S. Hay. The chairman of the London Section, Dr. J. J. Fox, will preside. Mr. Hollings is the chief gas chemist to the Gas Light and Coke Co., and Mr. Hay is the deputy engineer of their Beckton gasworks. The paper will deal with their experience in working at full load for over twelve months the company's new benzol recovery plant at Harrow. This plant was designed for 75 million cubic feet of gas in 24 hours with a daily output of about 16,000 gallons of benzol and is probably the largest benzol recovery plant in the world employing the adsorption principle. Some very interesting results on the removal of sulphur from gas will be given.

Society of Chemical Industry

Bristol Section: Applications of Town's Gas

A JOINT meeting of the Bristol Section of the Society of Chemical Industry and the Institute of Fuel will be held on Thursday, February 1, at 7.30 p.m., in the University Chemical Department, Woodland Road, Bristol, when a paper on "The Industrial Applications of Town's Gas," will be read by Dr. C. M. Walter. The first part of this paper will be devoted to the application of town's gas for industrial heat-

ing, including the processes of carburising, re-heating, annealing, normalising, forging, metal melting, drying, central heating, and certain special applications in connection with the wholesale production of foodstuffs; the second part will deal with the application of town's gas for the running of commercial vehicles.

Glasgow Section: Joint Meeting with Institute of Chemistry

A JOINT meeting of the Glasgow Sections of the Society of Chemical Industry and the Institute of Chemistry was held in the Royal Technical College, Glasgow, on January 19, when Professor F. J. Wilson, chairman of the Glasgow Section of the Society gave an address entitled "Then and Now."

It was a surprising fact, said Professor Wilson, that a great number of substances hitherto regarded as chemical curiosities had now found industrial applications. A lithium-calcium-lead alloy is now used as a bearing alloy and the addition of thallium to lead is said to improve its resistance to deformation. Vanadium has been used in steels and now vanadium pentoxide was being used as an oxidising catalyst in the production of maleic acid and fumaric from benzene and furfuraldehyde respectively. The applications of tungsten in the electric lamp industry were well known and this element had now been incorporated in dyes—the Fanal dyes—which contained tungsten or molybdenum or both. The discovery of the rare gases of the atmosphere was a most fascinating chapter of chemistry and no one had imagined that these gases would ever be of any practical importance. To-day, however, the use of neon in electric signs is commonplace, while argon-filled electric lamps are accepted without surprise. Helium, on account of its non-inflammability and its lifting power, was of importance in airship development. In 1916 only about 30 cu. ft. of this gas existed in the world and its price would have been about £400 per cu. ft. In 1929 the price had been reduced to £7 per 1,000 cu. ft. Liquid sulphur dioxide was used in oil purification and as a solvent for toluene. Selenium dioxide was used as an oxidising agent and by this means methyl glyoxal and glyoxal had been obtained from acetone and acetaldehyde respectively. The incorporation of tellurium in lead was said to make the lead harder and more capable of withstanding pressure.

In the realm of organic chemistry the manifold uses of ethyl alcohol were now being realised. This liquid is useful as a solvent and was the raw material for a great number of other substances. It can be converted into acetaldehyde by a rigorously controlled catalytic oxidation using silver gauze and the acetaldehyde so formed was air-oxidised to acetic acid. The preparation of butyl alcohol and ethyl acetate from acetaldehyde was also described. Among the solvents described were decalin, tetralin, dioxan and the chlorinated solvents such as dichlorethylene and trichlorethylene. Professor Wilson concluded by dealing with reactions which were carried out under pressure and mentioned the production of methyl alcohol from carbon monoxide and hydrogen, benzoic acid from carbon dioxide and benzene, and urea from ammonia and carbon dioxide.

Institution of the Rubber Industry

Sales Section: Rubber Compounding

AT a meeting of the Sales Section of the Institution of the Rubber Industry, held at the Northern Polytechnic, London, on January 22, Mr. F. H. Cotton dealt with the subject of rubber compounding. He said that fillers were first mixed with rubber to modify its character, and gave as an example the fact that 120 years ago rubberproof coats could not be worn in a warm atmosphere for fear of sticking to the wearer. Compounds he said were first added to the rubber in order to overcome its tendency to stickiness and poor oil resistance.

Before rubber could be compounded it had to undergo a plasticising process known as mastication. The discovery that rubber turned from an elastic to a plastic material on mechanical kneading was a chance discovery by Charles Hancock whilst attempting to reunite scraps of waste rubber. We now know that the softening is largely caused by absorption of atmospheric oxygen. Samples were shown later in the rubber shop demonstrating that over mastication leads to a weak and porous vulcanised product. The compounds were mixed with the rubber either on a two roll mixing mill or in an internal mixer. Mr. Cotton showed a sample of rubber masticated on the mill and compounded with fillers without cutting the rubber across and folding in the manner familiar to rubber workers. It was surprising to note that the rubber actually in contact with the roll surface was still uncompounded, the fillers having remained in the surface layer. The correct order of mixing was then dealt with and mention was made of the great difference between the relative ease of mixing of different fillers.

Mr. Cotton then dealt with the reasons for which fillers were added to the rubber, giving details of the action of sulphur by itself and in the presence of various accelerators and activators such as zinc oxide. He spoke of fast and slow accelerators, paying particular attention to some recent developments in the delayed action type, some of which were heavy metallic salts which only became soluble in the rubber at a relatively high temperature.

Fillers of the inert type such as barytes and whiting, were added largely to facilitate processing by reducing the "nerve" of the rubber; whilst softeners such as pine tar and stearic acid were added to reduce internal friction (thereby preventing over-heating on the mill with consequent premature vulcanisation) and to improve dispersion. The action of reinforcing fillers such as carbon black and china clay was demonstrated by hanging 10 lb. weights on thin rubber rings containing them. Whilst the ring containing carbon black was obviously much tougher than the others, it was shown by means of an instrument known as a reboundometer that the carbon black mix was not really so resilient as the pure rubber mix. This was claimed as an advantage in a tyre tread compound required to act as a shock absorber. Further reasons for compounding included colouring the rubber, improving its ageing properties, aerating it for sponge production and improving its resistance to heat or chemicals.

After stressing the wisdom of compounding by volume rather than by weight, and pointing out that few fillers are actually cheaper than rubber when the latter sells in the neighbourhood of 4½d. per lb., Mr. Cotton concluded by advising closer correlation between laboratory tests and service conditions, and suggested that salesmen should be supplied with detailed particulars regarding the physical and chemical properties of their various rubbers.

Society of Public Analysts

Joint Meeting with Food Group

THE next meeting of the Society of Public Analysts on Wednesday, February 7, at the Chemical Society's Rooms, Burlington House, London, will be a joint meeting of the Society and the Food Group of the Society of Chemical Industry, and will be devoted to a discussion on the methods of examining fruit and fruit products. Papers to be read include, "The Analysis of Fruit and Fruit Products." (E. B. Hughes, F.I.C., and A. E. Maunsell, B.Sc.), and "The Examination of Fruits and Jams by Lead Precipitation," (C. L. Hinton, F.I.C.).

Royal Society of Arts

Growth of the Canning Industry

THE Canning Industry will be the subject of a paper by Mr. T. N. Morris, of the Low Temperature Research Station, Cambridge, to be given at the Royal Society of Arts, London, on February 28. Dr. E. F. Armstrong, F.R.S., will preside. This paper, which will be illustrated by means of the epidiascope, will outline the growth of the canning industry and deal with the process of canning, the wholesomeness and food value of canned goods, technical difficulties associated with the use of tinplate, the results of research, and the place of canning in human affairs.

Chilean Nitrate and Iodine

Incorporation of the New Sales Corporation

THE full translated text of the Chilean Act incorporating the new Chilean Nitrate and Iodine Sales Corporation has now been circulated to the London banks which are chiefly concerned, and "The Financial News" (January 23) gives full particulars of the measure, which was signed by the President of Chile and promulgated on January 6.

It is understood that the entire profit of the industry is to be concentrated in the hands of the new corporation, which will acquire the whole of the producers' output at cost of production and then sell the nitrate at market price. Of the profits, 25 per cent. will go to the State and the remainder will be retained to cover the service of the Cosach Bonds and to provide the producers' profit. Payments will only be made to those holders of the 7 per cent. prior secured Cosach bonds who accept the new terms. The total service of the bonds—both interest and sinking fund payments—is to be reduced to 6 per cent. The profit necessary to cover the service of the bonds would be $4,160,000 per annum, which is not an impossible figure in normal times. In place of the Cosach shares there are to be issued shares in a new company representing, broadly, the ex-Cosach companies other than Lautaro and Anglo-Chilean.

National Physical Laboratory

Papers Published During December

THE National Physical Laboratory has commenced to issue a monthly list of papers read or published by members of its staff. This is the outcome of numerous inquiries received from industrial bodies and individuals who wish to be kept in touch with the work of the laboratory. Included in the December list are the following:—

"Heat Transfer between Metal Pipes and a Stream of Air," by E. Griffiths and J. H. Awbery. Read before the Institution of Mechanical Engineers, London, December 15.

"The Electrical Properties of Sea Water," by R. L. Smith-Rose. Read before the Royal Society, London, December 14.

"Research Work on Dental Amalgams." By C. H. Desch, (British Dental Journal, No. 55, p.605).

Phenol and Tar Acids

New British Standard Specifications

THE British Standards Institution has just issued seven new specifications covering phenol and the whole range of the more generally used cresylic and carbolic acids. Certain of the specifications will be of some interest to pharmacists, and of first importance to the manufacturers of pharmaceuticals derived from phenol or cresol, their use ensuring the supply of regular quality from one consignment to another, and of tar acid fractions which are already commercially available. Makers of synthetic resins and the disinfectant manufacturers will, on the other hand, be concerned at one time or another with each of the whole series, and the same argument of routine commercial availability of uniform material will be sufficient to ensure the fullest use of the specifications by these two industries.

The specifications are completed by the inclusion of precisely defined methods of testing compliance or otherwise with each specification, the standard methods of the Standardisation of Tar Products Tests Committee having been specially reviewed and amplified for the particular purpose of these specifications. These new British Standards are Nos. 515, Crude Carbolic Acids, 60's and 45's; 516, Distilled Carbolic Acids, 60's and 45's; 517, Cresylic Acid of High Orthocresol Content; 521, Cresylic Acid (50/55 per cent. Metacresol); 522, Orthocresol, Metacresol, and Paracresol; 523, Phenol; and 524, Refined Cresylic Acids. Copies can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Corrosion-Proof Lead

A New German Process

LEAD can be made resistant to corrosive agents by a new process of the I. G. Farbenindustrie, the essential feature of which is incorporation with metals, such as copper, antimony and silver, whilst avoiding formation of a eutectic mixture. According to the "Chemiker-Zeitung," November 29 (page 944), the additional metal is introduced either by any convenient mechanical operation—sprinkling with metallic shavings, mixing, pressing, cementation—or by electrolytic treatment. When simply applied to the surface of the lead, the additional metal is more firmly embedded by a hammering treatment. Metals imparting resistance to corrosion are those which function as the cathode in the resulting bimetallic system and therefore bring about formation of passive layers. Lead which has been subjected to rolling treatment with a certain proportion of silver is completely resistant towards hot concentrated sulphuric acid, whereas a lead-silver alloy offers no resistance to attack by this acid.

Letters to the Editor

Research and Industry

SIR,—The recently issued report of the Department of Scientific and Industrial Research, deals with a matter on which I wrote in THE CHEMICAL AGE of April 15, 1933 (page 331). It was then suggested that "it would be a great advantage, if all industries were so convinced of the value of research that Acts of Parliament could be done away with, so far as these compel firms to support research stations."

It has apparently been suggested that industries which do not support research should not be given protection by import duties or quotas. Most of us would agree that this is just. When a few of us got out the first scheme of this nature for the silk industry, there was no help given by the Government; it ran on its own. Afterwards when the Government scheme was started it came in and received help with the others.

I think that the backward industries in research, might still receive financial grants, but that when it can be shown that an industrial research scheme is so successful that the trade receives advantages like those mentioned (electrical and cast iron industries) that they should no longer expect financial aid from the State, but should support their own station, and be content with the great financial advantages which come from it, through research.

Grants might be made to stations which cannot yet show financial gain to the industry concerned. It should be imperative that these stations are continued, and run on efficient lines. The work of the State should therefore be educational; insisting on the presence of such research stations, but helping those which cannot run on their own, until on a basis of "money back," they become self-supporting.

I also suggested that some steps should be taken to make certain that the industrial aim, and object, of the work undertaken should be obvious. That work which could with advantage be carried out in our colleges, should not be undertaken in these research stations. Also, no steps should be taken to prevent individual firms engaging in research of any character they may like. The efficient development of outside research of an industrial nature should be supported by help from a suitable trust or corporation, but this matter has been dealt with elsewhere.—Yours faithfully,

W. P. DREAPER, O.B.E., F.I.C.

27 Willow Road,
Hampstead Heath, N.W.

THE Dominion Bureau of Statistics reports that production of iron oxides by Canadian manufacturers in 1932 amounted to 5,240 tons valued at $46,161, as compared with 5,520 tons worth $49,205 for 1931. Output of the oxides was supplied entrely by four concerns located in the provinces of Quebec and British Columbia. Capital employed by the industry was $206,863, with 26 workers employed during the year.

News from the Allied Industries

Paper Manufacture

AT THE ANNUAL GENERAL MEETING of the German Society of Pulp and Paper Chemists and Engineers held in Berlin in December, Professor Dr. von Possanner, of Keethen, read a paper on "The German Standard Method of Testing Pulp," which aroused much interest.

Tanning

THE TANNING INDUSTRY has experienced the usual quiet period associated with the end of the year but now that stock has been taken of the situation, the trade is resuming its former briskness. The present fashion for grain gloving leathers appears likely to continue and very large contracts have been placed with glove manufacturers by the cutters who are evidently eager to cover their 1934 requirements at current rates. Chrome and semi-chrome tanned leathers are chiefly in demand. Chrome tanners of shoe upper leathers are as busy as ever and they are anticipating a very busy period during the next few months. The use of cellulose finishes is still extending and preparations are being made for another run on white and fancy coloured cellulose finished sandal leathers. The long run of the fashion for white lining leathers for shoes is almost at an end and lining leather manufacturers are everywhere turning to the production of colours, chiefly grey and fawn at present. Reptile dressers are on the increase and these leathers are now being exported to the Continent instead of being imported as formerly.

Rubber

THE LARGEST CARGO OF LATEX to cross the sea was unloaded at Liverpool, from the Blue Funnel steamer "Eumaeus," on January 18. It was brought from the Dunlop rubber plantations in British Malay. Instead of having 35 per cent. to 38 per cent. rubber content as previously, it has 60 per cent. rubber content. At Liverpool two specially-designed containers, capable of holding 26,000 gallons, have been erected. They were taken there by road by H. and T. Danks, of Netherton, and are the largest containers to be moved in one piece by road. Special pumping gear discharged the latex from the ship's hold into the containers. To prevent it solidifying between the ship's hold and the quay, the liquid rubber was pumped through the pipes at a rate of between 200 and 300 gallons a minute. The ship was discharged in two hours. The latex will be carried from the Liverpool containers to Dunlop factories at Liverpool, Birmingham, London and Leicester in 500-gallon containers by road or rail. In each container an agitator will keep the latex in liquid form.

Iron and Steel

IN CONNECTION WITH THE RE-OPENING of Brymbo Steelworks, where about fifty men have now been taken on for repair work and reconditioning, the following appointments are announced:—Mr. Glyn M. Jones, manager; Mr. Thomas Roberts, process manager and metallurgist; Mr. T. G. Littleboy, chief engineer; and Mr. J. L. Daniel, chief assistant engineer. The secretary of the new company is Mr. W. L. Venables. The works, which were closed down in the middle of 1931, were acquired two or three months ago by a new company, with Sir Henry Robertson as chairman.

THE GERMAN STEEL TRUST (Vereinigte Stahlwerke) for the first three months of its new financial year (October to December, 1933) reports an increase of 124 per cent. in book orders compared with the same period in 1932. The turnover of the company has increased from Rm. 138,800,000 to Rm. 163,040,000, but exports have declined from Rm. 51,600,000 to Rm. 48,540,000.

STEWARTS AND LLOYDS, LTD., are to issue £2,000,000 debentures in order to erect new steel and tube works at Corby, Northamptonshire, and also to undertake a development programme in connection with the iron ore and blast furnaces. Interest on the stock will be 4 per cent. and the price of issue 98 per cent., payable by instalments. Interest is to be payable on June 30 and December 31. Of the amount £500,000 is to be subscribed and allotted to Tube Investments, Ltd., who have a close liaison with the company.

Hexamethylene Tetramine

Use in Explosive Manufacture

UNDER certain conditions hexamethylene tetramine (hexa) reacts with nitric acid to form an extraordinarily powerful explosive which is known as hexogen in Germany and also in Italy. Chemically it is cyclo-trimethylene trinitramine and was discovered towards the end of the nineteenth century. For a long time it failed to acquire technical importance, but about 1916 it was used in Germany as a substitute for nitroglycerine. The war-time methods elaborated in Germany do not appear to have been ever published. According to Dr. A. Stettbacher, writing in the November issue of "Nitrocellulose," hexogen production on any considerable scale has involved preliminary formation of hexa-dinitrate, a highly stable salt when kept out of contact with oxygen. Its successful conversion into crude hexogen by reaction with a further calculated quantity of nitric acid depends upon efficient cooling arrangements owing to the intensely exothermic character of the reaction.

Pure hexogen exhibits a higher degree of stability than the crude product. Treatment with moderately super-heated steam in an autoclave is stated by Stettbacher to be an effective device for purification from the reaction by-products. Pressures up to 5 atmospheres which decompose the less stable impurities appear to be quite harmless to hexogen. Contact of the crude product with steam under 3½ atmospheres for 30 minutes leads to deposition of pure hexogen as a heavy, odourless powder. After suction-filtration and repeated washing, the product can be handled with comparative safety, undergoing no loss in weight when kept at a temperature of 100° C. for several weeks. It is a white, odourless and tasteless powder, only soluble in water to the extent of 0.15 per cent. at boiling point, but soluble in acetone. The maximum melting point of the stabilised body as prepared by Stettenbacher's method is 201° C.

Contrary to the earlier assumption of the acute danger involved by single stage nitration, Stettbacher now asserts that it can be carried out as safely as the two-stage method outlined above if the hexamethylene tetramine is added to ten times its weight of concentrated nitric acid. Full details are given of the safe laboratory preparation of hexogen by this rapid and direct method.

Research on Concrete

Temperature Rise During Process of Setting

A REPORT issued by the Department of Scientific and Industrial Research (Building Research Technical Paper No. 15, "Temperature Rise in Hydrating Concrete," H.M. Stationery Office, 1s. 3d.) deals with the rise in temperature in concrete in the process of setting and hardening caused by the chemical reactions between water and cement. In large masses of concrete the rises in temperature may be considerable, and this may not only affect the properties of the material itself but may influence the distribution and intensity of stresses throughout the mass.

According to this report recent researches, mainly in America, resulted in the realisation that the fundamental cause of some of the serious cracking that has occurred in large masses of concrete, is the expansion due to the heat evolved during the hydration process of the cement, followed by contraction during the subsequent cooling period. Rapid-hardening cements attain a high strength during the period when the temperature is highest. During the subsequent cooling period it is evident that the concrete may become subjected to internal strain, and this possibility has caused considerable concern among engineers.

ARGENTINE exports of casein during the first half of 1933, according to official statistics, total 11,149 metric tons (24,579,085 pounds), compared with 7,402 metric tons (16,318,449 pounds) during the first half of 1932, or an increase of 50 per cent. The average price during the 1933 half was 101.32 gold pesos (about £20 at par) compared with 39.17 gold pesos (£7 16s.) in the 1932 period.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

COLORATION of textiles.—British Celanese, Ltd., G. H. Ellis and E. W. Kirk. Oct. 26, 1931. 404,363.

SULPHONATED OILS.—Imperial Chemical Industries, Ltd., and R. Greenhalgh. July 18, 1932. 404,364.

COLORATION of cellulose ester or ether materials.—British Celanese, Ltd., G. H. Ellis and E. W. Kirk. May 3, 1932. 404,327.

MANUFACTURE or treatment of products or articles having a basis of cellulose derivatives.—H. Dreyfus. June 2, 1932. 404,331.

REACTION MIXTURES formed in the preparation of acetic anhydride by the thermal decomposition of acetic acid, treatment of. C. F. Boehringer and Soehne Ges. June 11, 1931. 404,333.

DEOXIDISING STEEL, process.—Soc. D'Electro-Chimie, D'Electro-Metallurgie, et Des Acieries Electriques D'Ugine. July 20, 1931. 404,300.

PLASTIC MATERIALS.—Imperial Chemical Industries, Ltd., D. T. Jones, A. Renfrew, and R. Burns. July 5, 1932. 404,279.

COLLOIDAL SUSPENSIONS suitable for insecticides.—Electro Chemical Processes, Ltd., and E. C. Large. July 9, 1932. 404,287.

AZO DYESTUFFS on the fibre, manufacture.—I. G. Farbenindustrie. July 9, 1931. 404,304.

ORGANIC CONDENSATION PRODUCTS, process for the manufacture. G. T. Morgan and E. L. Holmes. July 12, 1932. 404,317.

STEAM TRAPS.—N. Archer and Imperial Chemical Industries, Ltd. July 12, 1932. 404,323.

SULPHONIC ACIDS, and their conversion products, which may serve as valuable intermediate products for the preparation of dyestuffs, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 28, 1932. 404,381.

EMULSIFYING APPARATUS.—G. C. P. Chubb. Sept. 22, 1932. 404,409.

AZO DYESTUFFS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 3, 1932. 404,413.

TREATMENT with hydrogenating gases of carbonaceous materials.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 14, 1931. 404,422.

ALUMINIUM SILICON ALLOYS and methods of manufacturing the same.—Aluminium, Ltd. June 2, 1932. 404,463.

ARTIFICIAL MASSES, manufacture.—Soc. of Chemical Industry in Basle.—Feb. 3, 1932. 404,469.

MATERIALS consisting of or containing polymerisation products of acrylic acid or its homologues or derivatives of these substances or mixtures thereof.—Rohm and Haas Akt.-Ges. March 23, 1932. 404,504.

INHIBITING THE OXIDATION of readily oxidisable metals, method. Dow Chemical Co. June 17, 1932. 404,518.

DERIVATIVES of the di-hydroxy-benzenes and process for the manufacture of same.—F. Hoffmann-La Roche and Co. Akt.-Ges. May 14, 1932. 404,520.

ELECTRO DEPOSITION of tin.—Harshaw Chemical Co. Jan. 28, 1933. 404,533.

DISTILLATION OF MISCELLA and the deodorisation of the oils and fats contained therein.—P. L. Fauth Ges. June 30, 1932. 404,547.

FLUXES for the melting and refining of magnesium and magnesium alloys.—P. Briske and V. Prohl (trading as Briske and Prohl) and A. Luschenowsky. July 29, 1932. 404,563.

DISTILLATION OF ZINC and similar metals.—F. Krupp Grusonwerk Akt.-Ges. Sept. 23, 1932. 404,569.

CRACKING TAR and bituminous schist oils with recovery of by-products, process.—L. Boulanger and F. Emsens. Aug. 4, 1933. 404,571.

Complete Specifications Open to Public Inspection

REMOVING WATER from sodium cyanide solutions, process.—E. J. Pranke. July 15, 1932. 34667/32.

CATALYTIC PURIFICATION or polymerisation of cracked hydrocarbon vapours.—Houdry Process Corporation. July 11, 1932. 18417/33.

POROUS OBJECTS from metallic oxides, production.—Siemens and Halske Akt.-Ges. July 15, 1932. 18669/33.

DISPERSING PIGMENTS in cellulose ester solutions, process.—Brevolite Lacquer Co. July 14, 1932. 18727/33.

CYANINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. July 13, 1932. 19305/33.

AZO DYESTUFFS and intermediate products, manufacture.—Soc. of Chemical Industry in Basle. July 9, 1932. 19412/33.

CAUSTIC POTASH and oxalic acid, production.—R. Koepp and Co. Chemische Fabrik Akt.-Ges. July 9, 1932. 19553/33.

BASIC MAGNESIUM CARBONATE, processes for making.—American Zinc, Lead and Smelting Co. July 12, 1932. 19619/33.

CELLULOSE ESTERS, manufacture.—Soc. of Chemical Industry in Basle. July 11, 1932. 19639/33.

FORMALDEHYDE in a solid state, method of manufacturing.—L. Nasch. July 15, 1932. 19811/33.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. July 15, 1932. 19853/33.

CONVERSION EFFECTS, process of producing.—I. G. Farbenindustrie. July 14, 1932. 19979/33.

SOAP-LIKE MATERIALS, manufacture.—Deutsche Hydrierwerke Akt.-Ges. July 15, 1932. 19991/33.

SINTERED BODIES from metallic oxides, production.—Siemens and Halske Akt.-Ges. July 15, 1932. 20032/33.

TEXTILE ADJUVANTS, manufacture.—Soc. of Chemical Industry in Basle. July 15, 1932. 20079/33.

Applications for Patents

SYNTHETIC RESINS.—E. I. Du Pont de Nemours and Co. Jan. 10. (United States, Jan. 13, '33.) 975.

PURIFICATION of resins by distillation.—Dussek Bros. and Co., Ltd., and A. W. Thompson. Jan. 6. 568.

AGENTS for disinfecting seeds.—Fahlberg-List Akt.-Ges. Chemische Fabriken. Jan. 8. 653.

ELECTROLYTIC PRODUCTION of white lead.—H. G. Hills. Jan. 6. 583.

ROTARY RETORT for distillation of carboniferous materials.—H. J. Holford. Jan. 5. 443.

APPARATUS for manufacture of unsaturated esters.—I. G. Farbenindustrie. and J. Y. Johnson. Jan. 5. 507.

CONDENSATION PRODUCTS of anthracene series, manufacture.—I. G. Farbenindustrie. Jan. 6. (Aug. 9, '32.) 592.

THERMAL TREATMENT of carbonaceous substances.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 8. 661.

HYDROCARBONS of high molecular weight from isobutylene, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 10. 929.

KETONE-HYDRAZONES of the o-, m- and p-phenylhydra-zinc-sulphonic acids, manufacture.—I. G. Farbenindustrie. Jan. 9. (Germany, Jan. 14, '33.) 839.

PROTECTING WOOD against attack by fungus, means for.—Imperial Chemical Industries, Ltd. Jan. 4. 337.

ACENAPHTHENE DERIVATIVES, manufacture.—Imperial Chemical Industries, Ltd., A. Kershaw and M. Wyler. Jan. 5. 461.

ACID INHIBITORS.—Imperial Chemical Industries, Ltd. Jan. 8. 715.

DESTRUCTIVE HYDROGENATION of distillable carbonaceous materials.—International Hydrogenation Patents Co., Ltd., and H. E. Potts. Jan. 5. (July 7, '32.) 402.

HYDROGENATION under pressure of distillable carbonaceous materials.—International Hydrogenation Patents Co., Ltd., and H. E. Potts. Jan. 10. (Sept. 24, '32.) 901, 902, 903, 904.

ANHYDROUS SULPHATE of copper potassium.—P. Lanthier. Jan. 5. (France, Jan. 5, '33.) 417.

CONDENSATION PRODUCTS for sizes, dressings, etc.—Soc. of Chemical Industry in Basle. Jan. 9. (Switzerland, Jan. 11, '33.) 815.

REDRYING COPPER SULPHATE after use.—H. A. M. Toledo. Jan. 9. (United States, June 30, '33.) 828.

DYESTUFFS, etc.—E. E. Beard and E. I. Du Pont de Nemours and Co. Jan. 11. 1085.

DYESTUFFS.—E. E. Beard and E. I. Du Pont de Nemours and Co. Jan. 12. 1190.

DESTRUCTIVE HYDROGENATION.—J. G. Brown, C. Cockram and Imperial Chemical Industries, Ltd. Jan. 17. 1675, 1676.

DIAMINO-ALCOHOLS of the aromatic series, production.—Chemische Fabriken Dr. J. Wiernik and Co. Jan. 12. (Germany, Jan. 12, '33.) 1171.

DIAMINO-ALCOHOLS of the aromatic series, production.—Chemische Fabriken Dr. J. Wiernik and Co. Akt.-Ges. Jan. 12 (Germany, Feb. 1, '33.) 1172, 1173.

SYNTHETIC RESINS, production.—Chemische Fabriken Dr. K. Albert Ges. Jan. 15. (Germany, March 8, '33.) 1397.

DE-ESTERIFICATION PROCESSES.—H. Dreyfus. Jan. 13. 1308.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

A STEADY tone has prevailed in the chemical market this week, and business has been satisfactory, although fluctuations in the rates of exchange have continued to affect some sections of the market. Business in formic and oxalic acids, salammoniac, formaldehyde and acetone has been active, and large orders have been the subject of keen competition. The copper sulphate market remains quiet, and potassium carbonate and caustic potash are dull items. Several price changes are announced in the coal tar products section. There has been a further reduction in the price of pitch, with some forward business in refined coal tar. Pharmaceutical chemicals and essentials oils have been somewhat quiet.

LONDON.—Prices continue firm with a good, steady and increasing demand generally. There is no change to report in the coal tar products market from last week, prices remaining firm and unchanged.

MANCHESTER.—Here and there prices of chemicals on the Manchester market during the past week have been shaded a little, but the movements in this respect have barely been of much importance and taking the market generally values maintain the steadiness which has been a feature for so long now. The upturn in copper and lead this week has imparted a steadier undertone to the markets for the copper and lead compounds, though, so far without much actual effect on prices. The demand for textile bleaching and finishing products has been fairly active, but the uncertainty in the cotton trade, largely because of external influences, tends to make the outlook rather obscure. In the woollen and rayon sections, however, conditions are relatively favourable and there is a steady call for chemicals from these directions. On the whole, while existing contracts are being specified against, actual new bookings during the past week have not been extensive and have mostly been for deliveries at near dates.

SCOTLAND.—The Scottish heavy chemical market is very slow in re-acting to the New Year holidays.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 11¾d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3⅞d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 to £36; brown, £3 10s.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised Industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99⅔/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8⅞d. to 9d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8½d. to 8¾d. according to quantity in 2-cwt. drums; B.P., 9d. to

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d. to 9d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. net.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRATE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.

SULPHUR.—£10 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

Pharmaceutical and Fine Chemicals

PHENACETIN.—3s. 6d. to 3s. 9d. per lb.

VANILLIN, ex Clove Oil, 16s. to 18s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, 2s. 4d. to 2s. 5d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 5d. to 2s. 6d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification; refined, 1s. 10d. to 2s. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 10d. to 10½d. per gal.; standard motor 1s. 5d. to 1s. 5½d.; 90%, 1s. 5½d. to 1s. 6d.; pure, 1s. 8½d. to 1s. 9d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 3½d. to 3¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3¼d. f.o.r. North; 4d. to 4¼d. London. MANCHESTER: 3¼d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4½d. to 4¾d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked £10 per ton. Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium, soft, £3 per ton.

REFINED COAL TAR.—SCOTLAND: 4d. per gal.

TOLUOL.—90%, 2s. 8d. to 2s. 9d. per gal.; pure, 3s. to 3s. 3d.

XYLOL.—Commercial, 2s. 8d. to 2s. 9d. per gal.; pure, 2s. 11d. to 3s.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C. 9½d.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—4s. 3d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £11; grey, £16.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£6 10s. to £10 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 9d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 2s. 6d. per ton; export, nominal, £6 7s. 6d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 3s. per ton, carriage paid to railway station.

NITRATE OF SODA.—£7 16s. per ton nearest station.

NITRO-CHALK.—£7 5s. per ton nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON.—Jan. 24.—LINSEED OIL was steady. Spot, £19 15s. (small quantities 30s. extra); Feb., £18 2s. 6d.; Feb.-April, £18 5s.; May-Aug., £18 12s. 6d.; Sept.-Dec., £19, naked. RAPE OIL was inactive. Crude extracted, £25; technical refined, £26 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £13 10s.; refined common edible, £17; and deodorised, £18 10s., naked, ex mill (small lots 30s. extra). TURPENTINE was quiet. American, spot, 46s. per cwt.

HULL.—LINSEED OIL.—Spot quoted £18 12s. 6d. per ton; Jan., £18; Feb.-April, £18 5s.; May-Aug., £18 12s. 6d.; Sept.-Dec. £19 2s. 6d. COTTON OIL.—Egyptian crude, spot, £13 10s.; edible refined, spot, £15 15s.; technical, spot, £15 15s.; deodorised, £17 15s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £15 5s. naked. GROUNDNUT OIL.—Extracted, spot, £19 10s.; deodorised, £23 10s. RAPE OIL.—Extracted, spot, £24; refined, £25 10s. SOYA OIL.—Extracted, spot, £17 10s.; deodorised, £20 10s. per ton. COD OIL, 21s. per cwt. CASTOR OIL.—Pharmaceutical, 35s. 6d.; first, 30s. 6d.; second, 27s. 6d. per cwt. TURPENTINE.—American, spot, 48s. per cwt.

From Week to Week

OFFICIAL STATISTICS show that imports of proprietary medicines into Malaya during 1932 amounted to $1,270,000, as compared with $1,301,000 in the previous year.

MR. GRAHAM JAMES MCFARLANE, of Belltrees, Linwood, Paisley, a well-known chemical manufacturer, has died in his 88th year.

THE CHEMICAL SUPPLY CO., LTD., has issued to its customers a new year gift in the form of an acceptable telephone number and message pad.

NENAGH (COUNTY TIPPERARY) COUNCIL has requested the Irish Free State Minister for Industry and Commerce to allocate one of the industrial alcohol distilleries, which the Government is to establish, to their town.

IN CONSEQUENCE OF THE DEATH of the late chairman of the Changkat Salak Rubber and Tin, Ltd., Mr. Thomas Arthur Gallie, the directors have appointed Sir John T. Cargill, Bt., to the vacancy.

MR. J. L. D. GIBSON of Barnsley, was appointed receiver for the Barnsley Chemical Co., Ltd., on January 10, under powers contained in debentures dated November 9, 1923, in place of H. A. Dawson.

DR. J. DONALD POLLOCK has been appointed chairman of the board of the British Oxygen Co., Ltd., and Mr. P. B. Liversidge has been appointed chairman of the management committee of directors.

THE DIRECTORS OF ROBERT PULLAR, AND SONS, LTD., Keirfield Works, Bridge of Allan, and Ashfield Works, Dunblane, have presented Mr. John Muir, manager at Ashfield, with a silver salver on the occasion of his having completed 50 years' service with the company.

THE BRITISH HANOVIA QUARTZ LAMP CO., LTD., has just issued a new edition of their brochure "Rapid Testing by Fluorescence," which gives a brief outline of the practical uses of the analytic quartz lamp in industry and research.

A BOOKLET GIVING A BRIEF OUTLINE of the manufacture, standardisation and testing of Insulin-Boots, as well as such aspects of present day insulin therapy as may be of general interest, has been issued by Boots Pure Drug Co., Ltd., Nottingham, from whom copies may be obtained by the medical profession.

PRELIMINARY NOTICE has been given by the Institution of Gas Engineers of the 71st annual general meeting to be held in London from June 5 to 8; the 2nd International Gas Conference at Zurich, September 1 to 4; and the 6th autumn research meeting in London, November 6 and 7.

MR. ALBERT EDWARD MARSHALL, of Woolton, Liverpool, formerly in the employ of United Alkali Co., at Widnes, has been appointed president of the American Institute of Chemical Engineers. It is about seventeen years since Mr. Marshall went to America as the representative of a Newcastle chemical firm. He is now in business as a consulting engineer.

SALES OF THE GERMAN POTASH SYNDICATE in 1933 totalled 940,000 metric tons, compared with 847,000 metric tone in 1932, an increase of about 11 per cent. The increase is mainly due to a rise in home consumption. But exports have also increased the year's total shipments of 220,000 metric tons, comparing with 207,000 tons in 1932.

THE GOVERNMENT OF THE IRISH FREE STATE is planning a big exhibition of Irish goods to be staged in the premises of the Royal Dublin Society at Ballsbridge, Dublin, in the autumn of this year. During the past two years there have been considerable developments in industry in Ireland and the Government considers that an Irish Industrial Exhibition will be the best means of bringing the home-made goods before the public.

THE COMMISSION appointed by the Irish Free State Government to investigate the possibilities of the development of phosphate rock deposits in North County Clare has despatched twenty-five tons of rock from the district to Dublin to be prepared at the factory of a chemical manure manufacturer. It is stated that the Commission desires to test the quality and hardness of the rock and its suitability to the machinery of firms at present engaged in the manufacture of phosphate manures in Ireland.

IT IS UNDERSTOOD THAT A FURTHUR APPEAL has been lodged in the case of British Celanese, Ltd., v. Courtaulds, Ltd. The original action was heard before Mr. Justice Clauson. British Celanese claimed an injunction to restrain the defendants, Courtaulds, from infringing certain letters patent belonging to British Celanese. Mr. Justice Clauson dismissed the action, and an appeal against the decision was dismissed by the Court of Appeal. The new appeal, it is stated, will be to the House of Lords.

SEVERAL HUNDRED POUNDS DAMAGE was caused by fire last week at the premises of Mr. J. Read, chemical manufacturer, 37 Nethergate, Dundee.

OFFICIAL STATISTICS show that imports of formic acid into Malaya during 1932 amounted to 1,560 tons as compared with 2,050 tons in the previous year.

AT A MEETING of the Board of the Institute of Physics held on January 16, the following were elected to membership: Fellows:—T. L. R. Ayres, E. J. Baldes, G. F. Brett, R. M. Davies, G. B. Deodhar, R. F. Hanstock, N. L. Harris, G. T. P. Tarrant, and W. S. Vernon. Associates: J. A. Conway, R. J. Davies, D. G. Drummond, M. Ghosh, J. Goodier, D. W. Lloyd, and A. J. Woodall, B.Sc. Student members: I. W. Ramsay and K. C. Wight. Ordinary member: L. E. Hall.

ANOTHER BENCH OF COKE OVENS was relighted at the Dumbreck by-product works of William Baird and Co., Ltd., at Kilsyth, last week. This makes the whole series of ovens now in commission for the first time for several years.

NOTICE WAS GIVEN in the "London Gazette" of January 19, of the voluntary winding up of Oil Refining Patents, Ltd., and the appointment of Mr. M. W. H. Lancaster, of 46 Basinghall Street, London, E.C.2, as liquidator.

THE CHIEF FEATURE of the "Daily Mail" Ideal Home Exhibition which will be held at Olympia, London, from April 3 to 28 will be a "Staybrite City," designed to demonstrate the possibilities of stainless steel in the home. The scheme will include a tower of steel rising 75 ft. from the floor.

INTERNATIONAL COMBUSTION, LTD., report amongst recent orders a 5 ft. by 36 ft. Hardinge ball mill for grinding soft ball clay; No. 0 and No. 0000 Raymond automatic pulverisers for grinding colloidal clays; 4 ft. by 5 ft., 3 surface Hummer electric screen for screening fireclay and grog; and 4 ft. 6 in. and 6 ft. dia. Raymond separating plants for separating oxides.

EXPERIMENTS WITH OIL FUEL distilled from coal by the Glasgow Gas Department has been discontinued on the municipal motor bus service. The general manager informed the transport committee that the experiment was continued for several months and had been discontinued as, in the opinion of engineers, the oil fuel distilled from coal gas unsuitable for modern motor bus engines.

OWING TO THE RECENTLY IMPOSED TAX of 1d. per gal. on crude oil, the St. Helens works of the United Glass Bottle Manufacturers have decided to return to coal. For four or five years past they have used crude oil for heating the furnaces. The new arrangement will mean that they will take about 100,000 tons of coal from the local collieries each year. It will be three or four months before the change over can be made.

HEXURONIC ACID, first isolated by Szent-Györgyl and recently renamed ascorbic acid, has been supplied for research purposes, by Burroughs Wellcome and Co. for more than a year and is now being issued as "Tabloid" ascorbic acid, 0.005-gm., each tabloid being equivalent in vitamin C activity to two teaspoonfuls of freshly expressed orange juice. This is the second pure crystalline vitamin to be issued as a "Tabloid" product as vitamin D has been issued for some years, first as "Tabloid" irradiated ergosterol and now as "Tabloid" calciferol.

MR. W. R. GORDON, director of the Coal Utilisation Council, has announced the Council's decision to exhibit at the 1934 British Industries Fair. The exhibits to be shown at Birmingham wll be the first of their kind in the history of Britain's basic industry and of the Fair. They will prove that coal is still our cheapest and most efficient fuel. Even more important, perhaps, they will demonstrate how coal should be used to get the best out of it at the lowest cost. This is by no means generally understood.

THAT GERMANY WILL BECOME COMPLETELY INDEPENDENT of imports of foreign petrol and the heavier fuels is foreshadowed by Dr. Carl Bosch, chairman of the Board of the German Dye Trust. Dr. Bosch feels his statement is warranted by recent developments in the extraction of fuel oils from coal on a commercial basis. German chemists are extracting petrol and a large number of heavy and lighter oils from both lignite and anthracite, using a high-pressure form of hydrogenation. By the end of this year, when the process should be in full operation in the Dye Trust plants, it is expected that every 3,500,000 tons of coal will yield 1,000,000 tons of petrol. Sixty per cent. of Germany's petrol consumption could thus be covered by utilising only 2.3 per cent. of the Ruhr coal production. Dr. Bosch has been working closely in the experimental stages of his invention with Professor Bergius, who, with Dr. Bosch, was awarded the Nobel Prize for chemistry in 1931.

A FINAL OFFER to Scottish farmers to grow sugar beet has been made by the Cupar Factory, the only one in Scotland to take advantage of the Government subsidies. Scottish farmers have been for some years demanding a free-on-rail basis, and because this was refused declined to grow beet in areas distant from Cupar. This demand has been conceded in the new terms, which should induce farmers to increase beet production. The factory offers 37s. per ton free on rail as a basic price to Scottish growers, but announces that unless the contracted area reaches 4,000 acres it reserves the right to cancel contracts and close the factory.

MR. GEOFFREY A. N. HIRST has been elected chairman and managing director of Transcutan, Ltd., of Leeds. In addition to being a governing director and deputy chairman of Hirst Brooke and Hirst, Ltd., Mr. Hirst is a member of the grand council as well as the executive committee of the Federation of British Industries as the representative of the Leeds and District Committee, a member of council of the Leeds Chamber of Commerce, vice-chairman of the Board of Governors of the Leeds Technical College, a member of the executive committee of the Drug and Fine Chemical Manufacturers' Association, a member of council of the Economic League (Leeds District), Fellow of the Royal Economic Society, Fellow of the Royal Statistical Society and Fellow of the Institute of Company Accountants.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for an increase in the import duty on (i) pencils consisting of strips manufactured wholly or partly of graphite, carbon, chalk, gypsum, talc, colours or dyestuffs; and encased in wood, paper or other materials, but not including propelling pencils, and (ii) strips of the description set out above including those for propelling and other mechanical pencils. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than February 19. The committee announces that the application for drawback under Section 9 of the Finance Act, 1932, in the case of phenacetin in respect of the para-phenetidine used in its manufacture, has now been withdrawn.

DEVELOPMENTS HAVE TAKEN PLACE RECENTLY with regard to the deposits of colloidal clay at Cloyne and Ballinacurra in East County Cork, Ireland, which Professor J. Bayley Butler has been investigating for some time. His examination of the material and works tests have proved that the deposits were valuable and during the short time that they have been operated commercially they have proved highly remunerative and further developments are to take place shortly. A company, of Cloyne Colloidal Clay Co., has been formed and assisted by the Free State Government. A loan is also being granted by the Minister for Industry and Commerce under the Trade Loans Act.

THE DEATH OCCURRED suddenly at his home on January 20, of Mr. John Haworth, general manager of the Sheffield sewage disposal department and chief chemist and water examiner to the Sheffield Corporation. Mr. Haworth, who was 64 years of age, was public analyst at Tiverton from 1893 to 1899, and was at the same time lecturer of chemistry and physics at Tiverton Technical Schools and Blundell's School. Since his appointment at Sheffield in 1899 the whole of the sewage disposal works there have been reconstructed under his direction. Mr. Haworth had been president of the Association of Managers of Sewage Disposal Works, and was a Fellow of the Institute of Chemistry, Fellow of the Chemical Society, a member of the Society of Chemical Industry and a member of the Society of Public Analysts.

MR. T. F. LE MESURIER, publicity manager of the Coal Utilisation Council, has outlined a nation-wide coal publicity campaign planned by the Council. The campaign to be put into operation in the very near future would be divided into four main sections. The first would appeal to both industrial and domestic users on a national basis, the second would be directed towards various groups of industrial users, the third would appeal especially to domestic users on the grounds of sentiment and the comfort associated with coal fires, and the fourth, carried on through the newspapers published outside London. The output of coal for internal consumption had fallen from 174,000,000 tons in 1913 to 149,500,000 tons in 1932.

THE WORLD'S MOST ISOLATED POWER PLANT is probably at the mines of the Mutual Chemical Co. in New Caledonia, a French island 750 miles off the coast of Queensland and 1,000 miles from Sydney. To aid the mining of chrome ore there, the company has put in a battery of Diesel engines and air compressors. To insure against interruption in the operation of the plant, special attention has to be paid to the lubrication of the machinery, and all the equipment is lubricated with products of the Vacuum Oil Co. and according to methods worked out by their engineers. A major breakdown would require sending 12,000 miles for a spare part, and operations would be hindered for 6 to 9 months.

DR. A. E. DUNSTON, chief chemist to the Anglo-Persian Oil Co., and a director of the National Oil Refineries Ltd., visited Swansea, on January 19, to deliver a lecture on "Petroleum Production and Refining" to a joint meeting of the South Wales branches of the Institute of Petroleum Technologists, Institute of Chemistry, and Society of Chemical Industry. He dealt with the great oil development in Iraq and Persia, and supplemented his remarks with two cinematograph firms, exhibited by Mr. Gray, of the National Oil Refineries, Llandarcy. Dr. Dunstan's details of the enormous Iraq pipe line project, just completed, was of special interest to his audience in view of the fact that the pipe work connected with it came to the Mannesmann Tube Works, Swansea.

SPEAKING AT THE ANNUAL GENERAL MEETING of the members of Turner and Newall, Ltd., at York, on January 18, Mr. Samuel Turner (chairman of the company) said that during the past twelve months the work of consolidating the insulation companies into one organisation, Newalls Insulation Co. has been completed, and the new concern is organised on the most simple but efficient basis, and is giving excellent service to a wide range of customers. The insulation business shows a steady but encouraging increase, though still affected by the continued depression in shipbuilding. Large contracts for the supply and erection of insulating materials have been carried out, however, at Barking, Battersea and Dunston Power Stations, all new super-power stations under the Grid System.

AT AN INQUIRY INTO THE LOCAL COUNCIL'S PROPOSAL to construct new sewerage works at Milborne Port, Somerset, held on January 13, it was stated that a percentage of arsenic had been discharged for some time past into a river there. The arsenic was contained in the effluent from a local tannery. Mr. T. Dyte, a representative of the firm, stated that for the last 50 years even larger quantities thon shown in the analysis produced that day had been discharged, but no injury or death had resulted. The Ministry of Health Inspector agreed that no trace could be found of this in the files of the Ministry. It was stated that the firm had agreed to construct works to stop the escape of arsenic by means of sedimentation, and that under the proposed scheme the effluent from the sewerage works would not be discharged into the river, but on to a meadow.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—The Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, invites tenders for (1) 30,000 gallons benzol and (2) 2,250 gross straw covers for 2-lb. bottles. Samples required with tenders for each schedule. Tenders due February 2, 1934, for Schedule 1 and February 9, 1934, for Schedule 2. Forms of tender obtainable from the above at a fee (which will not be returned) of 5s. for each schedule.

Argentina.—The Commercial Secretary to H.M. Embassy at Buenos Aires reports that the Argentine State Oilfields are calling for tenders, to be presented in Buenos Aires by February 16, for the supply of about 95,000 kilogs. of paint and colours of various kinds; and considerable quantities of raw and boiled linseed oil, varnishes, turpentine, methylated spirit, putty, glue, chalk in powder, etc. (Ref. B.Y. 7742.)

New Chemical Trade Marks

Opposition to the registration of the following trade marks can be lodged up to February 10, 1934.

Triklone. 544,520. Class 1. Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. 544,521. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1. September 13, 1933.

Opposition to the registration of the following trade marks can be lodged up to February 17, 1934.

Metso. 544,418. Class 1. Sodium metasilicate for use as a cleansing agent in manufacturing processes. Joseph Crosfield & Sons, Ltd., Bank Quay, Warrington. September 9, 1933.

Lescol. 546,236. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. The London Essence Co., Ltd., Lefresco Works, 53 Glengall Road, Peckham, London, S.E.15. November 17, 1933.

Forthcoming Events

Jan. 29.—Society of Dyers and Colourists (Huddersfield Section). Joint meeting with Huddersfield Textile Society. "Peroxide Bleaching." H. Wilkinson. Huddersfield Technical College.

Jan. 30.—Royal Institution. "Some Aspects of the Scattering of Light by Matter." C. G. Darwin. 5.15 p.m. 21 Albemarle Street, London.

Jan. 31.—Manchester Metallurgical Society. "Alloy Steels." J. A. Jones. 7 p.m. College of Technology, Manchester.

Jan. 31.—Institution of Chemical Engineers. "The Washing of Gas." H. Hollings and L. Silver. "Multi-Stage Washers." L. Silver. 6 p.m. Burlington House, London.

Jan. 31.—Society of Chemical Industry (Newcastle-on-Tyne Section) and Institute of Chemistry (N. E. Section). "Complex Aromatic Ring Structures." Dr. Fraser Thomson. 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Feb. 1.—The Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, London.

Feb. 1.—Mid'and Metallurgical Societies. Discussion. "The Metallurgical Inspection of Engineering Materials." 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

Feb. 1.—Society of Dyers and Colourists (West Riding Section). "Carbonised Pieces and their Dyeing." Dr. L. L. Lloyd.

Feb. 1.—Royal Institution. "Vitamins." L. J. Harris. 5.15 p.m. 21 Albemarle Street, London.

Feb. 1.—Society of Chemical Industry (Bristol Section). "The Industrial Applications of Town's Gas." Dr. C. M. Walter. 7.30 p.m. University Chemical Department, Woodland Road, Bristol.

Feb. 1.—Institution of the Rubber Industry (Midland Section). "Modern Compounding Practice." Arnold H. Smith. Grand Hotel, Birmingham.

Feb. 2.—Bedson Lecture. "The Chemical and Physical State of the Upper Atmosphere." Dr. G. C. Simpson. 6.30 p.m. Armstrong College, Newcastle-on-Tyne.

Feb. 2.—The Chemical Society. Discussion on "The Early Training of the Chemist." 6 p.m. University College of North Wales, Bangor.

Feb. 2.—West Cumberland Society of Chemists and Engineers. "The Bessemer Steel Process in America." B. Mason. 7 p.m. Workington.

Feb. 2.—Andersonian Chemical Society. "Some Scientific Worthies." A. Kent. 3 p.m. Royal Technical College, Glasgow.

Feb. 2.—Scottish Technical Societies. "Some Recent Developments in Fuel Research." Dr. F. S. Sinnatt. 7.30 p.m. Royal Technical College, Glasgow.

Feb. 3.—Society of Chemical Industry (Birmingham and Midland Section). Annual dinner-dance arranged by the Midland Chemists' Committee. 7 p.m. Midland Hotel, New Street, Birmingham.

Company News

Eastwoods, Ltd.—An ordinary dividend of 2½ per cent., less tax, the same as for 1932-33, is announced for the past year.

J. and E. Hall.—A loss of £4,868 is reported for the year to September 30 last, against a profit of £20,627 in the previous year. After paying the preference dividend, £5,171 remains to be carried forward.

American Cyanamid Co.—A special dividend of 25 cents. per share is payable on February 1 to holders of "A" and "B" shares of common stock. The directors state that the distribution is to be regarded as return to stockholders out of earnings for 1933 and not the establishment of a dividend basis or policy for the future.